Concepts *for* Nursing Practice

Jean Foret Giddens

FOURTH EDITION

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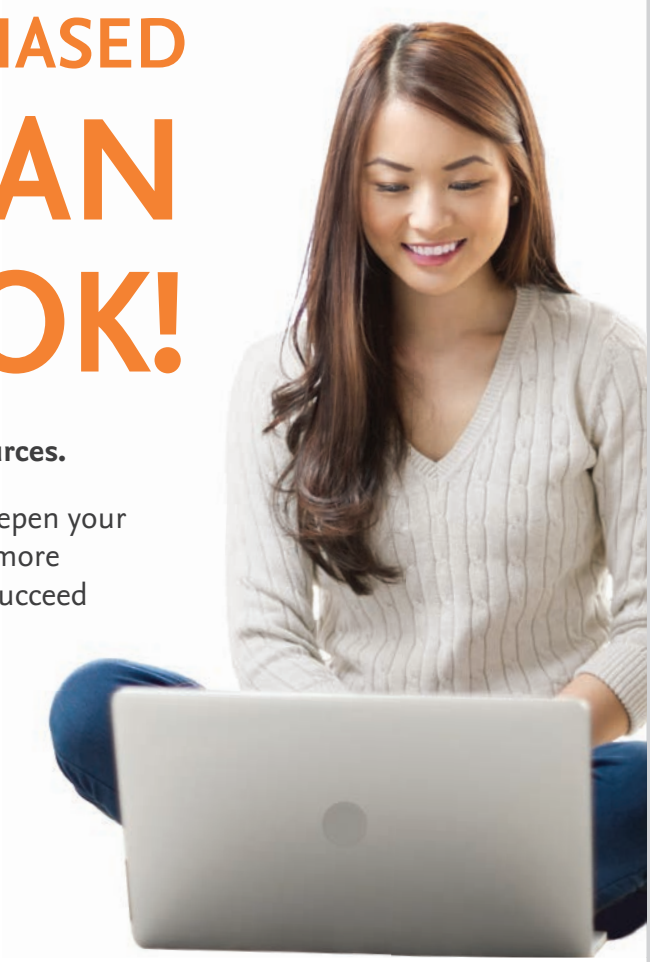

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PREFACE

Wisdom means keeping a sense of the fallibility of our views and opinions, and of the uncertainty and instability of the things we most count on.

Gerard Brown

INTRODUCTION TO CONCEPTUAL LEARNING

Conceptual learning is a major education approach—not in nursing alone, but across numerous disciplines. This belief is based on the premise that *concepts* can be used effectively as unifying classifications or principles for framing learning while knowledge increases exponentially.

So, what is a *concept*? Simply stated, a concept is an organizing principle or classification of information. A concept can be limited or complex in scope and can be useful as a basis for education from preschool through doctoral education. In advanced applications, concepts are considered building blocks or the foundation for theory.

By gaining a deeper understanding of a core set of concepts, a student can recognize and understand similarities and recurring characteristics, which can be applied more effectively than memorized facts. Teaching conceptually turns traditional learning upside down, focusing on generalities (concepts) and then applying this understanding to specifics (exemplars), instead of the traditional educational approach that focuses more heavily on content and facts.

HOW THIS BOOK IS ORGANIZED

The conceptual approach in nursing involves an examination of concepts that link to the delivery of patient care. There are multiple concepts applicable to nursing practice. This book does not attempt to present all nursing concepts, nor does it suggest that the featured concepts chosen are the most important. However, the 60 concepts featured in this book are commonly seen in nursing literature or are representative of important practice phenomena; they are the concepts that apply to the broadest group of patients of various ages and across various healthcare settings. A simplified concept presentation format using consistent headings is intentionally used so that students will find the approach intuitive; at the same time, an understanding of more formalized conceptual analyses will be fostered. Three overarching groups of concepts are featured:

- **Health Care Recipient Concepts**—concepts that help us understand the individuals for whom we care
- **Health and Illness Concepts**—concepts that help us make sense of the multiple health conditions experienced by our patients across the life span
- **Professional Nursing and Health Care Concepts**—concepts that guide our professional practice in the context of health care

These three overarching sections are further categorized into *themes,* into which concepts are organized to provide a structured framework. This structured approach promotes a thorough understanding of individual concepts and their important context within related healthcare concepts.

Each concept provides a full spectrum of information, with separate subheadings for concept definition, risk factors, health assessment, context of the concept to nursing and health care, interrelated concepts, case studies, and examples (exemplars) of concepts in practice. Each piece helps build an understanding of the concept as a whole, which in turn will promote the development of clinical judgment, a key outcome if nursing students are to practice effectively in today's complex healthcare environment.

FEATURES

Concept discussions include holistic concept diagrams that help visualize conceptual processes, along with *interrelated concepts* diagrams. These illustrations encourage students to build important associations among interrelated concepts. Each chapter also has a set of *Core Competencies* that describe what a student should be able to do with what they know, as it relates to the application of the concept in the practice setting. *Case Studies* provide an example of the concept applied in the context of patient care or practice setting.

An extensive list of *exemplars* (boxes at the end of every concept chapter) is based on incidence and prevalence across the life span and clinical settings. The *Featured Exemplars* section provides a brief explanation of some of the most important exemplars. Using custom technology, direct links to selected exemplars have been embedded into a core collection of Elsevier eBooks. This option of linking directly to a curated list of exemplars in a set collection of titles allows for a seamless user experience by uniting concepts to priority exemplars. Although instructors have complete flexibility to choose those concepts and exemplars best suited to their particular institution, these direct links are provided to allow quick access to those exemplars likely to be used in the majority of cases.

Interactive review questions incorporated into a self-assessment student testing engine are provided as an additional feature of this book's Evolve website (http://evolve.elsevier.com/Giddens/concepts). These student questions include multiple-choice and multiselect questions to simulate the NCLEX™ Examination testing experience, along with correct answer options and rationales.

Additional material to support faculty is included on the *Evolve Instructor Resources* site. A number of resources are provided to offer assistance in developing and teaching in a concept-based curriculum. Additionally, TEACH Lesson Plans, PowerPoints, and test banks have all been developed at both the RN and PN level to accommodate all learning needs.

CONCLUSION

Why use a conceptual approach? An exponential generation of new knowledge and information in all areas of our world (including health care and nursing) has made it literally impossible for anyone to know all the information within the discipline of nursing. The study of nursing concepts provides the learner with an understanding of essential components associated with nursing practice without becoming saturated and lost in the details for each area of clinical specialty. If concepts are understood deeply, links can be made when these are applied in various areas of nursing practice.

The conceptual approach also fosters future advancement of the nursing discipline. This book serves as a guide to learning about concepts and their application in clinical nursing practice. The conceptual approach provides the foundation for learning, clinical practice, and research efforts needed to continue to build substantive knowledge to the discipline of nursing. The conceptual approach represents a journey that embraces change. Let the journey begin!

Jean Foret Giddens

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SECTION I

Health Care Recipient Concepts

ATTRIBUTES, RESOURCES, AND PREFERENCES

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One of the most known phrases, "*Know thyself*," is an ancient Greek aphorism and refers to understanding yourself – knowing one's character and maintaining awareness of one's strengths and limitations. The meaning of this phrase is linked to the need for self-awareness and is necessary in reaching one's full potential. In fact, Aristotle is credited with saying "Knowing yourself is the beginning of all wisdom." In a similar spirit, the phrase "*Know thy patient*" refers to addressing and optimizing health outcomes for patients by fully understanding their needs, preferences, strengths, and limitations.

Healthcare services are designed to meet the unique needs, preferences, and attributes of individuals. Nurses and other healthcare professionals counsel and provide advice related to healthcare decisions based on their clinical expertise, best practices informed by evidence, and a plan of care in active partnership with patients and their families. Thus, understanding the unique attributes of every patient, and incorporating this understanding into care, is fundamental to professional nursing practice. For the successful delivery of patient-centered care, nurses should know how to assess and apply the concepts presented in this unit.

Several concepts are associated with patient attributes and resources that reflect the unique characteristics of the patient, including their developmental stage (*Development*), their *Functional Ability*, and their situation at home with family members (*Family Dynamics*). Two other concepts influence the personal preferences and experiences of individuals, which must be factored into care decisions. These are the concepts of *Culture* and *Self-Management*.

Gaining a full understanding and competency of the concepts in Section I is necessary to support the overall healthcare experience of patients and their families, particularly as it relates to supporting behaviors, interests, and decision-making. These inform providers of strategies necessary to reach decisions that are mutually acceptable and agreeable to patients and providers.

CONCEPT 1

Development

Leigh Small and Ann Sheehan

A basic characteristic of all human life is change. Development is a complex process that involves the integration of an expansive variety of gradual changes that occur across multiple domains and result in an individual's functional abilities. These changes usually increase in complexity according to a dynamic, somewhat predictable sequence that begins at conception and continues over the life span until older age and/or death.[1–4] The individual's state of health, environmental context, and/or life experiences may alter an aspect of the individual's development, causing it to stagnate or regress to an earlier stage. The ability to provide patient-centered, quality care requires nurses to understand and assess the different aspects of an individual's development and appropriately adjust the care they provide. It is also important for nurses to recognize when expected developmental progression in any area is not occurring so that collaborative interventions can be initiated.

DEFINITION

Development refers to a set, predictable sequence of physical, psychosocial, and cognitive changes that take place over the human life span.[1,3] Development does not occur as an isolated phenomenon. Rather, it represents the dynamic integration of three aspects of change: growth, differentiation, and maturation. *Physical growth* is a quantitative change in which an increase in cell number and size results in an increase in overall size, weight of the body, or any of its parts. *Differentiation* is the process by which initially formed cells and structures become specialized. This is both a quantitative and qualitative change from simple to complex in which broad global function becomes refined and specific. *Maturation* is the emergence of personal, behavioral, or adultlike physical characteristics or a "ripening." Maturation enables an individual to function in a fully developed and optimal way. Thus, maturation increases adaptability and competence for individuals to adjust to new situations.[3] Development, as well as the interrelated processes of growth, differentiation, and adaptation, is significantly affected by genetics, environmental factors, culture, family values, and personal experiences.[3–6] Therefore, the overall concept of development, as defined in this context, affects all aspects of every individual and directs all aspects of nursing care. Times during which development rapidly occurs (i.e., infancy, childhood, adolescence, and older adulthood) deserve special attention and in-depth knowledge because nursing care will need to responsively adjust, and nurses will need to adapt to the developmental changes of the patient more frequently and on an individual basis.

The unique sets of skills and competencies that need to be mastered at each developmental stage across the life span for the individual to cope with the environment are called *developmental tasks*.[7] Developmental tasks are broad in scope and are, to a significant degree, determined by culture.[8] The tasks may relate to the individual or the family. Examples of developmental tasks are climbing up steps unassisted and coping with the loss of a spouse.[9]

The order of developmental task attainment is more important than the chronologic age at which each occurs because, although development is ongoing, its speed varies across individuals. Furthermore, each individual has a unique developmental pace moderated by their state of health, environment, genetics, and social/family context. Rate and level of development are also related to the physiologic maturity of all systems—particularly the neurologic, muscular, and skeletal systems.

SCOPE

The scope of the concept, or extent to which development influences an individual (i.e., expected, delayed, or advanced development; Fig. 1.1), spans the entire life course—from birth to death (Table 1.1). Normal human development is organized, progressive, and usually occurs in a predictable sequence. Based on this expected sequence, stages of development have been identified. The traditional stages of development have been identified by general age groups and include embryologic, infant, toddler, preschool, school age, adolescent (teen), early adulthood, middle adulthood, and late adulthood. These stages identify characteristics found in the majority of individuals within a stated age range. Although individuals vary in the time of onset of each stage and in the length of time spent in each stage, the sequence itself rarely varies.

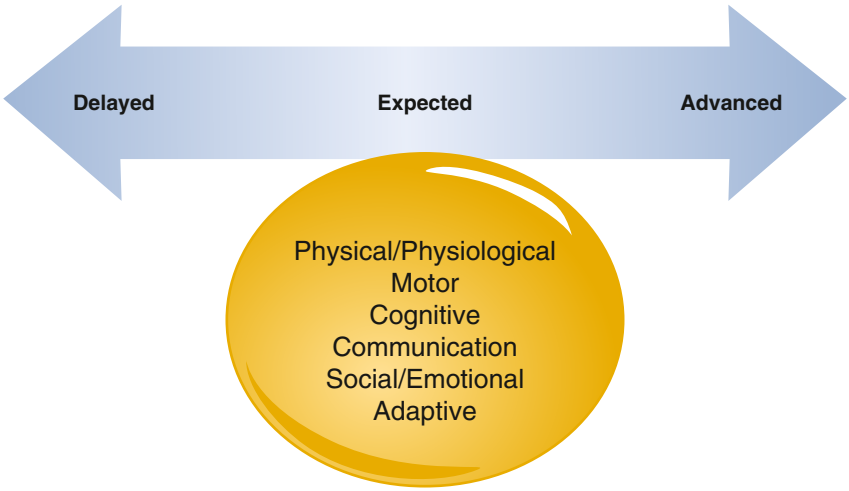

FIG. 1.1 Scope of Development.

TABLE 1.1 Identified Developmental Age Compared with Chronologic Age

Developmental Age	Chronologic Age
Birth	Conception through birth
Infant	Birth through 12 months
Toddler	12–36 months
Preschooler	36 months–5 years
School-ager	5–12 years
Adolescent	12–18 years
Young adulthood	18–35 years
Middle adulthood	35–65 years
Older adulthood	
Young-old	65–75 years
Middle-old	75–85 years
Old-old	>85 years

Types of Development

Development is a complex and interconnected concept that has been distilled into six overarching categories or domains: physical/physiologic, motoric, social/emotional, cognitive, communication, and adaptive (Fig. 1.2). The accelerated and decelerated paces of development occur somewhat independently within each domain (e.g., physical/physiologic, motor, social, cognitive, and communication). For example, while gross motor skills are changing (i.e., infant walking), language skills may not be developing as quickly. Similarly, an older school-aged child may be demonstrating advanced physical maturation but not yet achieving advanced states of emotional maturation. Thus, age-related developmental expectancies or norms are always based on an age range—never an exact point in time when specific skills will be achieved.[1,3,10] Although the pace of development within each of these domains occurs independently, the progression of skills in the subcategories is also interconnected and reliant on development in the other domains.

Physical/Physiologic Development

Physical/physiologic development refers to the growth and changes in body tissues and organ systems and the resultant changes in body functions and proportions. Physiologic development includes cellular proliferation, differentiation, and maturation that occurs in each organ and system that allows integrated human functioning necessary for life and health (i.e., infant hematopoietic maturity and secondary sexual characteristic development leading to sexual function). Overall, physical growth and development occur in a bilateral and symmetric way, progressing in a cephalocaudal (head-to-toe) direction (i.e., infants have a disproportionately larger head-to-body ratio compared with that of an adult) and proximodistally (from midline to periphery). There are gradual physical changes that occur in middle adulthood, with individuals losing approximately 1 inch of height between 30 to 50 years. Height loss occurs more rapidly in late adulthood due to bone loss in the vertebrae.[1]

Motoric Development

Motoric development is frequently separated into two major categories: gross and fine motor. Very generally, motoric development progresses from achievement of gross motor to fine motor skills—a process referred to as refinement.[11,12] Gross motor skills involve the use of large muscles to move about in the environment. Examples of gross motor development include the sequential skills of sitting, standing, maintaining balance, cruising, walking, running, walking up stairs without assistance, and more complex physical tasks such as playing soccer. Fine motor skills involve the use of small muscles in an increasingly coordinated and precise manner. Examples of fine motor development include the achievement of the successive skills of batting at an object, reaching and holding an object, transferring an object from hand to hand, holding a pencil in a refined grasp, making marks with a pencil, writing letters and words, and the complex skill of creating masterful artwork. Other fine motor skills such as using the hands and fingers to eat, draw, dress, and play are all required to achieve optimal functioning.[13,14] Fine motor development is contingent upon cognitive and neurologic development. Height and muscle mass regress in middle and late adulthood, although being physically active can reduce the extent and speed of muscle mass loss.[1]

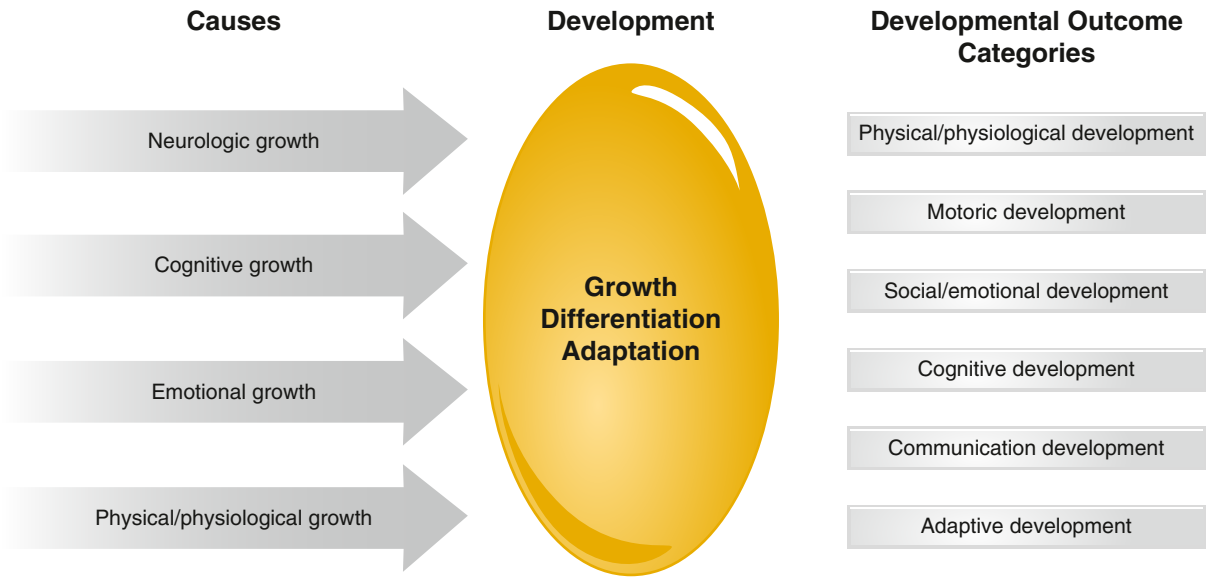

FIG. 1.2 Development Concept Categories.

Social/Emotional Development

Social and emotional development includes the development of self-understanding, understanding of others, and understanding of social interactions.[1,2,11,12] These different elements of social/emotional development usually occur in this order (e.g., self, others, and social interaction). Knowledge of social/emotional skills is critical because it directs effective communication with an individual(s) and may affect suggested environmental strategies for an individual to attain optimal functioning. For example, young preschool children cannot distinguish between their effort and ability and are likely to overestimate their competence and abilities. Thus, caution should be used regarding self-reported ability(ies), and nurses should seek confirmation (e.g., "Johnnie says that he can swallow pills. Have you seen Johnnie take pills before, or is Johnnie better able to swallow liquid medicine?"). Development of an understanding of others (perspective taking) includes a growing comprehension that other people have emotions and intentions, whereas objects do not. This understanding is foundational to the development of trust and morality and the ability to interact with others. These aspects of development underlie the ability of children to discern the difference between a truth and a lie. A complicating aspect of social/emotional development is emotional regulation, which directly affects relational interactions (i.e., play, work, and social interactions).[15] This complex aspect of development declines during the aging process in an indeterminable rate, underscoring the need to consider and assess areas of social/emotional development throughout the life span.

Personal identity develops over the course of a person's life and is affected by their life experiences.[15] Identification of one's sex, sexual orientation, gender, race, and ethnicity are important to the development of self-esteem or self-concept. School age is the time race and ethnicity identification develop. Adolescence is when gender norms solidify, and sexual and romantic attraction develops.[16] During this time, self-concept is formalized with the incorporation of sexual orientation identity.[16] Young adulthood (18 to 35 years) includes exploration of identity as new roles are tried out. More information related to gender and sexual identity can be found in Concept 20.

Cognitive Development

The cognitive dimension of development relates to working memory capacity, cognitive self-regulation, and the processing and use of information about the environment and objects in the environment. In addition, individuals have an increasing understanding of relationships between self-understanding and information over time. These processes underlie the development of critical thinking skills and executive functioning, which includes learning, forming concepts, understanding, problem solving, reasoning, remembering, and abstract thinking. Ultimately, these complex aspects of cognitive development, in combination with advanced social/emotional developmental stages, enable moral and spiritual development.[1]

Some have suggested that there are different aspects of intelligence that include analytical, creative, and practical components,[11,12] whereas others have conceptualized intelligence to include many different types of intelligence.[17] Because the brain has reached 90% of its adult weight and completed the majority of synaptogenesis and myelination by 6 years of age, the individual is deemed to be at an optimal ready state for formal education—a process thought to stimulate cognitive development. In late adulthood, maintenance of cognitive abilities is affected by a decline in the speed of processing, decrements in executive functioning (e.g., attention and memory), and potentially by reduced or limited cognitive stimulation, which leads to continued synaptic pruning and decreased synaptogenesis.[1] Life span cognitive development and "brain science," including the effect of the environment and trauma, have become a primary focus of recent research. Additionally, there is growing evidence that physical exercise and engagement in complex stimulation (i.e., cognitively challenging computer games) may stimulate neurogenesis and/or slow the demyelinating effects of aging or disease (i.e., Parkinson's and Alzheimer's disease).[1] Another area of significant research activity is focused on neuroplasticity (both

functional and structural plasticity), or the brain's ability to adapt as a result of experience (i.e., stroke, brain trauma) or training (developing previously lateralized abilities contralaterally).[1]

Communication Development

Speech is the spoken expression of language. The three components of speech are (1) articulation, which refers to the pronunciation of sounds; (2) voice, which refers to the production of sound by the vocal cords; and (3) fluency, which refers to the rhythm of speech. Language involves a set of rules shared by a group of people that allows the communication of thoughts, ideas, and emotions. Communication is a process that requires both receptive and expressive skills. Receptive language function is the ability to hear and understand what others say. Expressive language function is the ability to develop and express one's own thoughts, ideas, and emotions.[18] Speech and language development synergistically occur with cognitive, neurologic, and fine motor development and require optimal sensory function (e.g., hearing), sensory integration, and interactional relationships to develop and refine.

Simple speech begins with utterances of consonants, increases to include vowels ("ba-ba" and "da-da"), then single words are formed ("no" and "me"), and two- and three-word combinations arise ("me do" and "you up"), leading to the development of meaningful phrases and sentences. This language explosion or "period of exuberance" is an outward demonstration of frontal lobe development and typically occurs in children 18 months to 3 years of age. This is a specific example of a critical developmental time point, meaning that if significant speech and language gains are not made during this time, the delay may have resultant sequelae (i.e., a variety of learning disorders). Speech and language continue to increase in complexity during the life span until older adulthood, a time during which communication and speech may decline or become impaired as a result of health impairment or disease (e.g., expressive aphasia that results from a stroke).

Adaptive Development

Adaptive development refers to the acquisition of a range of skills that enable independence at home and in the community. Adaptive skills are learned and include self-care activities such as dressing/undressing, eating/feeding, toileting, and grooming; management of one's immediate environment; and functional behaviors within the community, such as crossing the street safely, going to the store, and following rules of politeness when interacting with others.[19] Demonstration of skills in this developmental domain requires advanced and complex skills in each of the other developmental domains previously discussed and efficient sensory integration processes. Examples of adaptive development include cooperation; a level of moral and ethical decision making; and abilities to follow social and cultural folkways, mores, taboos, rules, and laws.

ATTRIBUTES AND CRITERIA

Expected Development

A person who is considered to have *normal* development is one who demonstrates the expected developmental and physical maturation, physiologic function, and/or expected tasks within or across the developmental domains (e.g., physical/physiologic, motoric, social, cognitive, and language) associated with the individual's chronologic age.

Developmental level refers to an individual's stage of development (e.g., stage of epiphyseal closure in long bone development, Tanner stage of pubertal development, and stage of cognitive development) or ability to independently achieve an outcome (e.g., perspective taking and abstract reasoning).

A *developmental milestone* is an ability or specific skill that most individuals can accomplish in a certain age range.[1,10] The categories of age ranges typically include those individuals who experience rapid developmental change, such as infants, toddlers, preschoolers, school-aged children, and adolescents (teens), with emphasis on the growing child. However, milestone attainment and loss are appreciated across the life span. Common use of the term "developmental milestones" typically refers to changes that involve *motoric, social, emotional, cognitive,* and *communication* skills. In the context of this concept presentation, development also includes *physical/physiologic milestones* (Box 1.1). For example, every aspect of physical and physiologic growth and maturation has been carefully mapped and normed to the general population and several subpopulations (e.g., weight for age, body mass index for age and sex, and kidney and liver growth and development). Classically defined, developmental milestones occur when a confluence of critical changes (i.e., neurologic, cognitive, emotional, and physical) occurs, marking a significant or critical point of maturation. As a result, these milestones provide a basis for developmental assessment and serve as major markers in tracking development.

BOX 1.1 Attributes of Development

Physical/Physiologic Development
- Growth
- Physical characteristic development
- Organ system maturation

Motoric Development
- Fine motor development
- Gross motor development

Cognitive Development
- Critical thinking
- Executive functioning

Communication Development
- Speech
- Language

Social/Emotional Development
- Social skills
- Emotional control
- Gender and Sexual Identity

Adaptive Development
- Adaptive skills
- Functional skills
- Environmental Management

Abnormal Development

If an individual does not accomplish milestones within a specified age range or critical period, he or she may be identified as being *developmentally delayed,* signifying that an essential element of neurologic and/or cognitive maturation has not occurred within an age range and should be investigated. The definition of developmental delay varies, but it usually involves a delay of at least 2.5 standard deviations in one or more areas or subcategories of development. In other words, a developmental delay would be identified if a developmental change was not found in an individual that can be found in 95% of others of the same chronologic age range. Certain individuals may demonstrate advanced development in one or more developmental domains/categories (see Fig. 1.1). The developmental changes assessed would include physiologic and physical development, motoric, cognitive, communication, social/emotional, and adaptive development.[20] Individual delays within a developmental domain may be demonstrated in subtle ways and may not affect overall functioning unless the delays are pronounced and developmental progress continues to lag over time.

An individual who has accomplished a developmental milestone rarely loses this ability unless the individual encounters a significant stressor (e.g., hospitalization, a new disease diagnosis, or significant traumatic experience). For example, once a child learns to sit or stand or becomes toilet trained, it is unusual for such skills to be lost without cause. The loss of developmental milestones, or *developmental regression,* is very subtle, and parents often miss this occurring in their own children. Recognizing the loss of a previously attained developmental milestone is as important of an assessment finding as the identification of achieving milestones. When developmental regression has occurred, the underlying cause must be identified with the goal of ameliorating the situation, addressing underlying health conditions affecting development, and restoring developmental gains as soon as possible.

Developmental arrest is the plateau of developmental change in some category and is noted when chronologic age continues to progress but developmental change does not. Developmental arrest can be differentiated from lagging or slowed development because of its significant effects on an individual's functioning. Physical or growth arrest can be the result of underlying health abnormalities or social conditions (e.g., abuse, neglect, or social isolation) that may or may not have been diagnosed. Cessation in physiologic development (organ or system maturation) frequently results in significant functional limitations or chronic health conditions. For example, some believe that developmental arrest that occurs in utero results in a congenital anomaly.[13]

It is estimated that at least 8% of all children from birth to age 6 years have developmental problems and/or delays in one or more areas of neurocognitive development. A *global delay* refers to lag in multiple neurocognitive developmental areas—speech and language, gross and fine motor skills, and personal and social development.[21] Some individuals are identified as having a *pervasive developmental disorder* (PDD), which means that they have significant developmental delays in many basic milestones and skills that often cross developmental domains. PDD is usually identified by 3 years of age, which is a critical time in an individual's development. Frequently, children with PDD have delays that affect the ability to socialize with others, to communicate, and to use imagination—all skills that usually emerge during this age. Thus, children with these conditions often demonstrate confusion in their thinking and generally have problems understanding the world around them—challenges that continue throughout their life. Specific types of developmental delays are presented in the "Clinical Exemplars" section later in this chapter.

There are periods within each of the domains of development that are characterized not only by critical periods (mentioned previously) but also by susceptible or sensitive periods. These are points in the life span in which there is greater susceptibility to positive or negative influences (e.g., genetics, environment, culture, family values, and personal experiences), with resulting beneficial or detrimental effects.[7] One example of the latter is the finding that young children with rapidly occurring frontal lobe development, the "period of exuberance," are particularly vulnerable to environmental toxins (e.g., lead intoxication) and exhibit marked detrimental effects from such exposures (e.g., stunted cognitive abilities or learning disabilities).[22]

THEORETICAL LINKS

Several theories have been developed throughout the years to understand different domains of neurocognitive development and define different developmental levels and/or stages within each domain. Four of the classic theories are presented: Freud's theory of psychosexual development (1930s and 1940s), Erikson's eight stages of psychosocial development (1940s), Piaget's theory of cognitive development (1960s), and Kohlberg's theory of moral development (1980s). Caution should be taken when considering each of these theories because controversy exists regarding their accuracy and applicability.

Freud's Theory of Psychosexual Development

The term *psychosexual,* as used by Freud, refers to any sensual pleasure. Freud believed that at different ages, particular areas of the body provide the chief source of sensual pleasure and that experiences with these pleasure centers significantly affect the development of personality. He outlined five stages of development: oral (birth to 1 year), anal (1 to 3 years), phallic (3 to 6 years), latency (6 to 12 years), and genital (puberty to adulthood). He identified conflicts associated with each stage that must be resolved for development to occur. Under stress, individuals were thought to regress temporarily to an earlier stage. If resolution was not satisfactorily achieved, an individual may become fixated in the stage, and personality development would be arrested.[23,24]

The validity and applicability of Freud's theory and associated underlying assumptions are frequently contested because his work was based on adults with mental health diagnoses and their reflections of past life experiences (retrospective data). However, the conceptual view that an individual matures and develops over time in a stagewise process and the environment affects those changes (i.e., relationships) was novel at the time and proved to be a critical step for the field of psychology. It resulted in other

theorists developing and testing hypotheses regarding specific aspects of cognitive and psychological development over the life span (i.e., psychosocial and moral development).

Erikson's Theory of Psychosocial Development

Erikson's theory of development focused on the psychosocial development of an individual across the life span. Erikson was a protégé of Freud, and the theory he developed was an expansion and refinement of Freud's theory specific to psychosocial development. Erikson identified eight stages of psychosocial development thought to occur between birth and death. These stages were identified by the conflict confronting the individual and included trust versus mistrust (birth to 1 year), autonomy versus shame and doubt (1 to 3 years), initiative versus guilt (3 to 6 years), industry versus inferiority (6 to 11 years), identity versus role confusion (11 to 18 years), intimacy versus isolation (18 to 25 years), generativity versus self-absorption and stagnation (25 to 65 years), and integrity versus despair (65 years to death). He also had a stagewise philosophy (every individual moves only in a forward sequential way through each stage, or development ceases), in which each stage had a particular task, identified in the form of a conflict, that must be resolved to progress to the next developmental level.[23,25]

Piaget's Theory of Cognitive Development

Piaget's theory of cognitive development sought to explain how children innately organize their world and learn to think.[26] In this theory, cognitive development is viewed as progressing from illogical to logical, from concrete to abstract, and from simple to complex. Underlying assumptions of this theory are that cognitive development is a product of inborn intellectual capacity, nervous system maturation, and perceptual ability, and exposure to new experiences serves as a stimulus for cognitive development. The theory posits that there are four general periods: sensory motor (birth to 2 years), preoperational (2 to 7 years), concrete operational (7 to 11 years), and formal operations (11 years to adulthood). Each period is composed of a number of stages that are age related, sequential, and stepwise forward.[15,27] These pioneering theories resulted in years of debate regarding the influence of nature versus nurture during a person's development; however, more contemporary theories allege that both play an important role.

Kohlberg's Theory of Moral Development

Kohlberg developed a theory that expands on Piaget's cognitive theory to address the development of an individual's moral reasoning across his or her life span.[28] According to Kohlberg, when a conflict in universal values occurs, a moral choice must be made. This choice is based on moral reasoning, which is postulated to develop progressively over three levels: preconventional (18 months to 5 years), conventional (6 to 12 years), and postconventional (12 to 19 years). Each level is composed of two stages. In this theory, development of moral reasoning is dependent on cognitive skills and neurologic maturation, but it is not definitively linked to specific developmental stages.[28] This theory furthered thought regarding other areas that undergo change and development during one's life.

Contemporary Theories

More contemporary scientists and students who study development appraise theories with regard to three main aspects: Does the theory suggest that development is continuous (uninterrupted change over time) or discontinuous (stepwise progression)? Does the theory suggest that there is only one path of development for everyone? What is the relative influence of nature and nurture according to the theory being discussed? Careful review and appraisal of those early developmental theories have given rise to many current theories, such as the ecological systems theory, Vygotsky's sociocultural theory, and theories of multiple intelligences.

CORE COMPETENCIES

Development

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to human development.
- Perform a clinically relevant developmental assessment, recognizing actual or potential health problems.
- Collaborate with the interprofessional team, the patient, and family members to establish mutual healthcare goals related to developmental issues.
- Using a person-centered approach, implement interventions, and evaluate the plan of care to address developmental needs.
- Demonstrate clinical judgment founded on a broad knowledge of development.

CONTEXT TO NURSING AND HEALTH CARE

Because of the frequency and intimacy of their patient contact, nurses are uniquely positioned to gain information about (assess) their patients and holistically intervene to improve patient health and functioning. Assessment of all six domains of development is well within a nurse's scope of practice and significantly affects the care that nurses and other healthcare providers offer. Care modified or directed by a person's development will be most appropriate and more likely to bring patients to optimal well-being and functioning. Therefore, it is important to recognize risk factors and age-sensitive time periods during which developmental progress may be threatened or decline may be hastened.

Risk Recognition

Developmental progress, delay, arrest, advance, or decline occur in all social classes and ethnic groups and across ages. Most frequently, these concepts are discussed in terms of pediatric populations (infancy through adolescence) because change in all categories of development is occurring rapidly.[29,30] Because development in all areas is interdependent, a delay, arrest, or decline during a period of rapid developmental change may place an individual at risk. Several types of risk exist, including the following:

- **Prenatal:** Genetic conditions, congenital infections, and prenatal exposure to environmental toxins, such as illicit drugs, alcohol, or cigarette smoke
- **Birth risk:** Prematurity, low birth weight, birth trauma, and maternal infection

- **Individual risk:** Ill health, malnutrition, physical or mental disabilities, and cognitive impairments
- **Family risk:** Low parental education, poor health of family members, large family size, and child removed from their home and placed in foster care
- **Situational risk:** Acute life stress, acute mental or physical health crises, acute school/social problems, bullying, interpersonal violence, sexual abuse, trauma (e.g., Adverse Childhood Experiences [ACES]), and acute conflictual or violent relationships
- **Social determinants of health (SDoH):** Poverty, environmental toxins, adverse living conditions, rural or urban living, areas with high prevalence of disease, community with low cohesion, limited access to health-promoting foods and safe physical environments that facilitate healthy activity, limited access to health care, homelessness, and food insecurity
- **Toxic stress:** Strict or authoritarian parenting, child and/or elder abuse or neglect, and exposure to domestic violence, chronic social isolation, and/or chronic everyday stressors
- **Health status:** Chronic illness (e.g., congenital heart disease, cancer, brain injury, cystic fibrosis, Parkinson's disease, and Alzheimer's disease), traumatic or severe injuries, and conditions requiring prolonged bed rest and/or multiple/prolonged hospitalizations[14]

Stressors, as perceived by children, may differ greatly from the stressors that caregivers may sense exist for a child. For example, loss of a pet, a move, integration into a new school, alterations in household members, and/or illness of family member, teacher, or friend may be extremely stressful for a child. In some cases in which children spend time with different adults in different contexts (e.g., child care and split time with a divorced parent), caregivers may be unaware that their child has experienced these stressors. Somewhat similarly, stress as perceived by an individual in late adulthood may differ significantly from the individual's caregiver and/or loved one(s).

Developmental Assessment

Development, as a concept, has implications for all aspects of nursing practice across all populations and healthcare settings. A thorough developmental assessment of all domains and recognition of risk factors that may affect development are essential for early identification of developmental problems. These assessments are also necessary to determine goals for rehabilitation and strategies to compensate and, thus, optimize function and overall health when limited progression is identified with/without illness or injury.

Assessment of development should independently occur for every domain of development. These critical assessments require focused attention and intervention, particularly when working with preverbal or young children and older adults with limited or diminished abilities to articulate accurate information, in situations with an absent primary caregiver, or in chaotic living situations in which limited historical data are available.

Infants and Children

Gross screening for developmental risks and lags or delays primarily occurs as a part of well-child health visits.[29] These assessments should be completed by healthcare providers with specialized training in child development and require direct observation with planned developmental challenges and parent report of development task accomplishment. Valid and reliable screening instruments are used and frequently involve documentation of specific skills, parent and/or teacher reports, and child reports. A classic tool used to measure developmental status is the Denver Developmental Screening Test II (DDST II). The DDST II is designed for use with children from 1 month to 6 years of age and has been standardized for minority populations. It assesses gross motor, fine motor, language, and personal-social skills and milestones. The two primary limitations to the use of the DDST II involve the limited sensitivity (83%) and specificity (43%) of the tool,[31] leading to a number of referrals for further evaluation of children suspected of being developmentally delayed but who are not truly developmentally delayed. In addition, the use of this tool does not identify children who have other diagnoses (e.g., cerebral palsy) that may affect the developmental changes anticipated in a child's early years.[3,9,32] Thus, the DDST II is recognized as a gross screening tool with inherent error and not a diagnostic tool.

When delay is suspected in any specific area of development, a more in-depth assessment with a valid, reliable, and highly sensitive and specific tool for that particular area is needed for diagnostic purposes. For example, an in-depth language assessment may be needed after a gross screening by the DDST II. Given this situation, a tool such as the Early Language Milestones Scale (ELM Scale-2)[33] may be used to assess visual, auditory receptive, and auditory expressive language in children between the ages of 1 month and 3 years. Assessment of social/emotional development may include the Modified Checklist for Autism in Toddlers–Revised (M-CHAT-R). This tool has been found to be valid and reliable and to have strong sensitivity and specificity.[34] Other examples of developmental screening tools that include parental report are the Ages and Stages Questionnaire (ASQ),[9] the Parents' Evaluation of Developmental Status (PEDS),[35] and the Learn the Signs/Act Early Interactive Milestones Checklist program sponsored by the National Center on Birth Defects and Developmental Disabilities at the Centers for Disease Control and Prevention (CDC).[36]

Detailed information and several assessment tools focused on child development are available from pediatric and developmental textbooks and reliable websites such as that of the CDC.[36] The Bright Futures website, developed by the American Academy of Pediatrics, includes specific information for healthcare providers.[37] Many Internet resources are appropriate for parents and interested care providers (e.g., child care providers), but it should be emphasized that screening tools do not provide a diagnosis. A diagnosis requires a thorough neurodevelopmental history, physical examination, advanced testing and assessment for specific delay, and assessment for potential underlying associated health disturbance.[21]

Adolescents

Routine physical examinations monitor continued development in all areas into the adolescent years. During the adolescent years, teens' major developmental milestones include

advanced cognitive thinking and risk-taking behaviors that accompany psychosocial, moral, and sexual development. To assess these areas of development, a HEADSS Adolescent Risk Profile may be used.[38] HEADSS is a screening tool that assesses the teen's *h*ome, *e*ducation, *a*ctivities, *d*rugs, *s*ex, and potential for *s*uicide for the purpose of identifying high-risk adolescents and the need for more in-depth assessment, counseling, and/or anticipatory guidance. Other general adolescent screening tools can be used, including CRAFFT (*C*ar, *R*elax, *A*lone, *F*orget, *F*riends, *T*rouble), which is a behavioral health screening tool for use with children younger than age 21 years to assess for behavior health risk, and RAAPS (*R*apid *A*ssessment for *A*dolescent *P*reventive *S*ervices)[39] or GAPS (*G*uidelines for *A*dolescent *P*reventive *S*ervices), developed by the American Academy of Pediatrics.[40] It is important to note that teens often develop mental health issues. Some may be the result of the tumultuous social and emotional changes encountered during adolescence, as well as many chronic mental health conditions that first manifest during prepubescence or adolescence (e.g., schizophrenia, substance dependence, and bipolar disorder). There are a multitude of specific, high-quality (valid and reliable) assessment tools that can be used with older school-aged children and adolescents to detect the presence and acuity of depression, anxiety, attention-deficit with/without hyperactivity disorder, and other mental health and developmentally associated issues.

Adults (Early and Middle Adulthood)

In adulthood, physical examinations and assessments should continue to monitor normal developmental patterns. However, the focus of these interactions frequently involves minor acute or chronic health disturbances. Physical/physiologic, psychological, and cognitive characteristics of individuals are assessed relative to age. For example, older females' reproductive organs are monitored for normal decline in function. This physiologic change may result in associated symptoms that are disruptive to the individual (e.g., "hot flashes"). In addition, mental health is an aspect of health and wellness that should be assessed in all individuals (e.g., depression). Screening tools designed for use with adults include the Recent Life Changes Questionnaire, the Life Experiences Survey,[15] and the Stress Audit, all of which aim to identify adults in need of supportive interventions and/or services relative to stress and coping.[34]

Later Adulthood

When adulthood is reached, often there is limited focus on developmental assessment until individuals reach the older adult stage, unless an adult has a serious mental or physical illness or injury or suffers a traumatic event. When this is the case, the focus is frequently on functional assessment (or functional ability)—that is, an assessment of an individual's ability to carry out basic activities of daily living (BADLs) and instrumental activities of daily living (IADLs).[41] BADLs include skills such as hygiene, toileting, eating, and ambulating. IADLs are skills that are needed to function independently and include preparing meals, shopping, taking medications, traveling within the community, and maintaining finances. Functional assessment is described in greater detail in Concept 2, Functional Ability. However, other developmental assessments such as cognitive function, memory, and speech, should be assessed as they may direct other specific interventions.

Care Delivery

Knowledge of the individual's development in all areas (i.e., physical/physiologic, motoric, social/emotional, cognitive, communication, and adaptive) is critical to nursing care even when no developmental problems exist. It determines appropriate communication strategies, teaching levels and techniques, safety provisions, assistance with activities of daily living, and approaches to therapeutic interventions. An individual's developmental level also determines need for anticipatory guidance, health promotion, and accident or illness prevention interventions. To provide appropriate information on recommended health screenings, immunizations, and chemoprophylaxis, as well as counseling on health topics such as injury prevention, cigarette smoking, alcohol and drug abuse, diet, exercise, and sexual behavior, the developmental level of all areas must be known.

Early identification and intervention are among the most important points when developmental delay(s) is present. In general, regardless of the type of developmental delay, the earlier that intervention occurs, the better the outcome. Management of neurocognitive developmental delay or decline truly requires intradisciplinary collaboration. Early intervention services can include one or more of the following services: nursing, medicine, physical therapy, occupational therapy, psychological intervention, individual and/or family counseling, nutritional consulting, speech and language services, play therapy, audiology services, and assistive technologies. All of these services have as their interprofessional goal to maximally develop a specified area and develop other areas to compensate for an identified disability, thus optimizing future development and functioning (e.g., readiness to learn in a preschool-aged child).

Physical/physiologic developmental limitations and/or challenges are not addressed in this chapter, although the effects of such problems have been suggested and will affect each of the health and illness concepts and, thus, affect nursing care. For example, glucose regulation of a newborn is affected differently from that of an adult because of the inability of the newborn to feed itself, the limited amount of brown fat for calorie stores, and the differential caloric loss due to temperature instability.[14] Similarly, tissue integrity in an infant is significantly different than that of a teen, early, or middle-aged adult. Premature and young infants as well as older adults have a greater degree of skin barrier dysfunction resulting in a higher transepidermal water loss, increased percutaneous absorption of chemicals, and higher risk for injury and/or bacterial invasion/infection.[14] Therefore, the effect of physical/physiologic development should be considered with review of each of the health and illness concepts contained in this text.

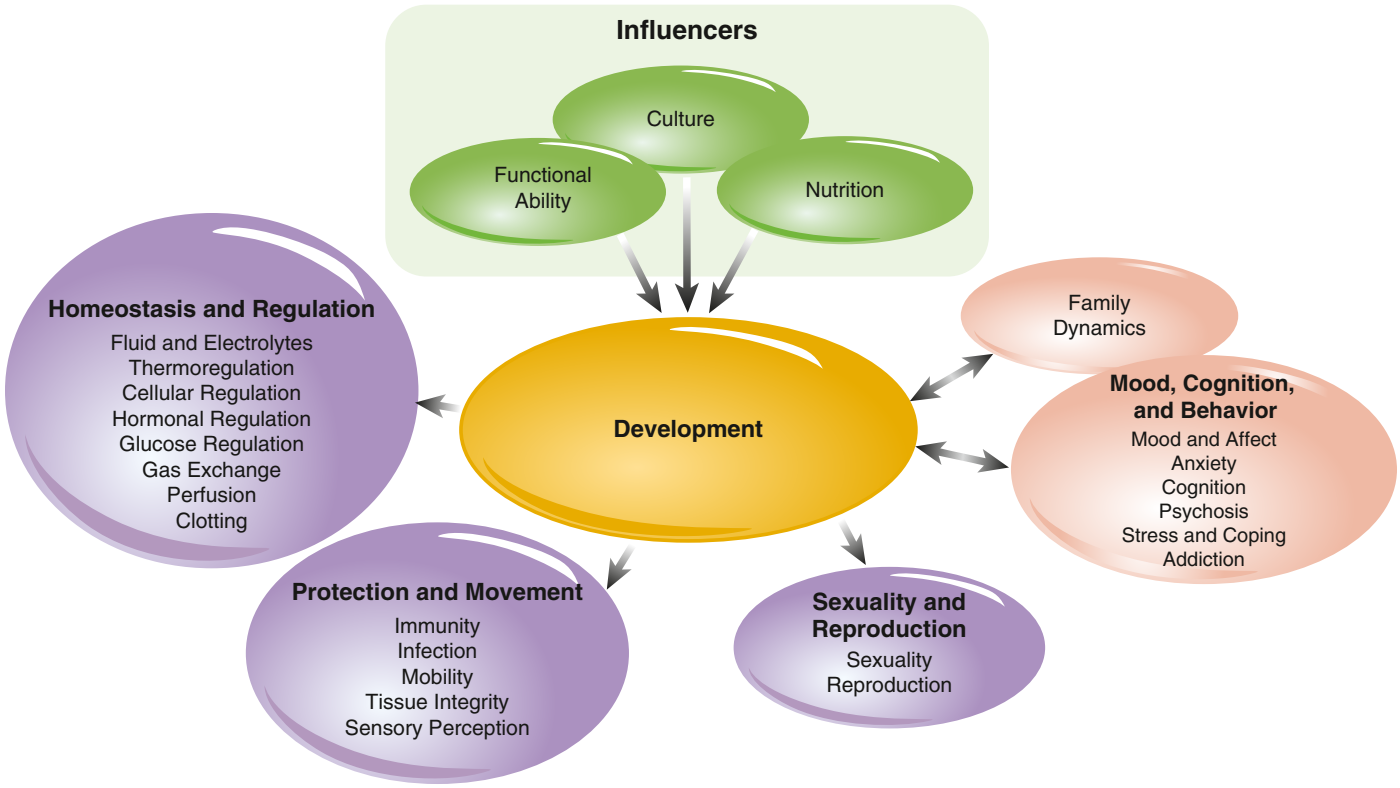

FIG. 1.3 Development and Interrelated Concepts.

INTERRELATED CONCEPTS

Concepts used to describe a person do not represent isolated phenomena but, rather, phenomena that interrelate with one another. The strength and direction of the effect of one conceptual phenomenon on another vary given the central concept under consideration. The interrelated concepts are presented in Fig. 1.3. Concepts representing major influencing factors and hence determinants of development include **Functional Ability, Nutrition,** and **Culture,** with its unique variations in practices and expectations. These appear in green at the top of the diagram, and their influence on development is indicated by the arrow pointing in the direction of the concept. **Family Dynamics,** and the concepts associated with the Mood, Cognition, and Behavior category, have a reciprocal relationship with development, represented by the red ovals with double-headed arrows. The concepts below the influencers (identified in purple at the bottom of the diagram) are the health and illness concepts significantly affected by **Development**. Note that there are only a few concepts not affected by development. The relationships are indicated by an arrow pointing from development to each of the concepts.

CLINICAL EXEMPLARS

There are multiple conditions associated with developmental problems; the most common exemplars are presented in Box 1.2 and can involve any of the developmental domains. Problems may result in a specific problem or deficit affecting one domain, or they may be pervasive or global, affecting many aspects of multiple domains. Causes of developmental problems are similarly complex. A small number of them are clearly identified as genetic or chromosomal problems. However, the causes of the vast majority are unknown, with numerous environmental conditions proposed as probable factors influencing their occurrence. Neurocognitive and physiologic developmental problems may be diagnosed in utero (e.g., Down syndrome diagnosed via amniocentesis, congenital heart disease diagnosed with a sonogram, and kidney development [hydronephrosis] diagnosed by ultrasound). Alternatively, developmental concerns can be diagnosed at birth (e.g., neuromuscular immaturity), or they may become evident with age and ongoing development (e.g., intellectual disability, leg length discrepancies, learning disabilities, and autism).[13] With advances in science and technology, causes of developmental disorders may be more easily identified and understood in the future, resulting in earlier diagnosis with increased accuracy. These advances should improve health outcomes related to developmental disruptions.

Featured Exemplars

Failure to Thrive

One of the most common physical development problems is that of failure to thrive/grow, a condition in which there is a deceleration or loss in weight and subsequent loss of linear growth (height/length). This has many etiologies categorized into three types: endogenous or organic (e.g., diagnosed/undiagnosed disease process, condition of the gastrointestinal tract,

BOX 1.2 EXEMPLARS OF DEVELOPMENTAL DELAY/DISORDERS

Physical/Physiologic Developmental Delay/Disorder
- Angelman syndrome
- Bladder exstrophy
- Hydronephrotic kidney disease
- Cleft lip/palate
- Congenital heart disease
- Cystic fibrosis
- Developmental hip dysplasia
- Down syndrome
- Failure to thrive
- Fragile X syndrome
- Hydrocephaly
- Klinefelter syndrome
- Prader-Willi syndrome
- Spina bifida and other neural tube defects
- Turner syndrome
- Missing/absent limb

Motoric Developmental Delay/Disorder
- Cerebral palsy
- Developmental dyspraxia
- Duchenne muscular dystrophy
- Hypertonia
- Hypotonia

Social/Emotional Developmental Delay/Disorder
- Autism spectrum disorder
- Asperger syndrome
- Childhood (pediatric) disintegrative disorder not otherwise specified (PDD-NOS)
- Failure to thrive
- Aggressive/bullying/violent behaviors
- Dysfunctional attachments
- Generalized anxiety disorder
- Obsessive-compulsive disorder
- Reactive attachment disorder
- Separation anxiety disorder
- Gender identity issues
- Depression
- Parental/caregiver neglect

Cognitive Developmental Delay/Disorder
- Attention-deficit disorder
- Attention-deficit/hyperactivity disorder
- Fetal alcohol syndrome
- Rett syndrome

Speech and Communication Developmental Delay/Disorder
- Central auditory processing disorder
- Deafness/conductive hearing loss
- Expressive language disorder
- Receptive language disorder

Adaptive Developmental Delay
- Blindness
- Oppositional defiant disorder
- Traumatic brain injury
- Attention deficit hyperactivity disorder

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

and inadequate nutrition), exogenous or nonorganic (e.g., inappropriate or dysfunctional feeding practices), or mixed type.[14] Weight/height loss or deceleration may be the result of emotional stress related to social isolation (e.g., neglect) or mental health difficulties (e.g., depression).

Cleft Lip and Palate

Physiologic developmental problems often have their origins in intrauterine development or embryologic formation and/or cellular division. There may be subtle or overt manifestations that are detected by thorough assessments. One exemplar would be a soft palate abnormality identified through physical examination of the oropharynx. This represents a midline deformity with its beginning in embryologic development. This defect can be demonstrated subtly (e.g., soft palate deformities) or overtly (e.g., cleft lip). It may result in significant functional impairment (inability to suckle from a breast or bottle) and emotional distress (facial deformity), or it may cause little effect on an individual's functioning.

Duchenne Muscular Dystrophy

A classic example of problems with gross and fine motor development identifiable by impaired motoric developmental milestone achievement is Duchenne muscular dystrophy. In this example, a preschool-aged boy may be identified as having difficulty climbing stairs or pedaling/balancing a two-wheeled bicycle. Closer assessment of the young child may identify positive Gower sign, which signifies impaired lower limb motoric development and/or developing weakness. This is a genetic recessive X-linked disorder that involves progressive proximal muscle weakness of the legs and pelvis.

Autism Spectrum Disorder

Perhaps the most commonly occurring impaired social/emotional development problem is autism spectrum disorder (ASD). Children with ASD demonstrate deficits in social communication and interactions across multiple contexts. Associated manifestations include repetitive patterns of behavior and activities and focused nonhuman interests. These children are most often identified in the toddler or preschool years, and despite intensive interventions, they have symptoms that cause impairment in social, occupational, and interpersonal functioning that persist throughout their life spans. Some children suffer mild impairment from their symptoms, whereas others are severely disabled.

Attention-Deficit/Hyperactivity Disorder

Cognitive and intellectual disabilities often evidence themselves in early childhood. One common cognitive disorder is attention-deficit/hyperactivity disorder (ADHD). This is considered

to be a minor impairment or learning disability. Symptoms include inattention, impulsivity, and excessive motor activity. Children must demonstrate symptoms prior to age 7 years and have persistent symptoms that cross settings (e.g., school and home) to have this diagnosis. Impairments in executive processing result in disorganized behavior and difficulties with memory, planning, and problem solving.[12] ADHD may also result from injury or disease.

Central Auditory Processing Disorder

Impairments of speech and language are often recognized as learning disabilities. The diagnosis of central auditory processing disorder (CAPD) has become more commonly applied. This disorder affects how the brain receives and processes what is heard. This, like other learning disabilities, is a lifelong problem and often affects an individual's social interactions. Children demonstrate symptoms of this disorder differently based on their ages and levels of cognitive development. For example, young children may appear to have speech delays, whereas school-aged children often have difficulty following spoken instructions, do not understand people who speak quickly, and cannot find the right words to say in conversation.

Traumatic Brain Injury

Adaptive development is the result of a complex integration of the multiple skills and abilities easily affected by injury, illness, substance use, exposure to trauma, or an accumulation of toxic chronic stressors. Traumatic brain injury (TBI) is an example of an adaptive developmental disability defined as *an external mechanical force resulting in permanent or temporary brain injury and associated cognitive, physical, or psychosocial dysfunction.* Immediate symptoms associated with TBI include deficits in motor coordination, confusion, and irritation. However, persistent symptoms include deficiencies in identifying, understanding, processing, and describing emotions; impulsivity; and mood swings. These chronic problems can result in lifelong cognitive and social deficits.

CASE STUDY

From AndreyPopov/iStock/Thinkstock.

Case Presentation

A first-time mother and father bring their 3-month-old daughter to a clinic appointment. When the nurse asks the parents if they have any concerns about the baby, the mother responds, "I'm worried because she is still so small. She does lift her head up when she is on her stomach, but she doesn't turn over from stomach to side. My neighbor says her grandchild was starting to turn over when she was about 4 months old, and my friend's baby who is just about the same age weighs a pound and a half more than mine."

As part of the assessment, the nurse gathers the following information:

- Length at birth: 46 cm (18.4 in.)
- Current length: 57 cm (22.4 in.; increase of 11 cm in 90 days)
- Birth weight: 2786 g (6 lb, 2 oz)
- Current weight: 5100 g (11.2 lb; increase of 2314 g in 90 days, or 25.7 g/day)
- Motor (gross and fine): Kicks when placed on back; holds head up 90 degrees and chest off floor when prone; bears weight on legs when feet placed on solid surface; reaches/swipes toward objects in a rudimentary manner; pulls objects toward midline
- Reflexes: Moro, tonic neck, and stepping reflexes readily elicited
- Social/emotional behavior: Child attends to faces within 8 to 10 in. away and appears expressive with eye and mouth movements at sight of mother or positive expressions of others
- Neurologic/cognitive: Follows a moving object past midline 180 degrees
- Speech and communication: Turns head toward sound; babbles

Based on knowledge of the different areas of development, the nurse assesses the infant's physical growth by comparing the birth weight and length with the current weight and length. The infant was born at 40 weeks of gestation; therefore, the physical growth is determined to be slightly less than the average height and weight for a female infant but with consistent growth acceleration from birth.

Follow-up is needed to review the mother's prenatal and birth history inclusive of intrauterine ultrasound tests, α-fetoprotein test, screens for prenatal infections and immunization titers, and the hospital newborn hearing screening result and newborn screening for inborn errors of metabolism and congenital diseases.

The nurse reviews the assessment findings with the mother and explains that the infant's development falls within the normal ranges at this point. The nurse also explains the different elements of development and the individualized nature of developmental milestone achievement, emphasizing that children normally differ in size, growth, and speed of development. Realizing the importance of providing anticipatory guidance to parents as a way of outlining expected developmental gains over time to decrease unusual expectations and anxiety, and to educate parents regarding abnormal or concerning changes, the nurse provides the parents with a list of developmental milestones for reference and tracking and a list of primitive and postural reflexes with their onset and extinction times. The nurse goes on to explain that even though biologically related, children in the same family normally differ in growth and speed of development.

Case Analysis Questions

1. Consider the length and weight of the infant. At what percentile is the infant for weight and length? Are these findings considered normal?
2. Consider the assessment findings for gross motor, fine motor, social/emotional, neurocognitive, and speech. Which of these milestones are met?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 2

Functional Ability

Lana Sargent

Health is the level of functional ability of an individual's mind and body. Historically, to be considered in "good health" meant that an individual was free from injury, disability, illness, or pain. A challenge to this view occurred when the World Health Organization (WHO) broadened the definition of health as a "state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity."[1] Expanding and refining the definition of "good health" or "healthy" is a paradigm shift that is inclusive and more representative of the human population, especially those with disabilities or chronic health conditions. Additionally, inequalities in education and socioeconomic status influence an individual's health and functional ability. The expanded view of health as it relates to functional ability is supported by one of the four overarching goals of *Healthy People 2030*—to promote healthy development, healthy behaviors, and well-being across all life stages.[2] A critical factor in the quality of life, and, therefore, in health, is an individual's ability to function. This view is further supported by the Institute of Medicine report *Crossing the Quality Chasm: A New Health System for the 21st Century,* which emphasizes that a goal of the U.S. healthcare system is "to improve the health and functioning of the people of the United States."[3] Thus, the concept of functional ability has implications for collaborative health care across all populations and settings.

DEFINITION

Functional ability refers to the individual's ability to perform the usual daily activities required to meet basic needs; fulfill roles in the family, workplace, and community; and maintain health and well-being.[4] Specifically, it reflects the adaptive dimension of development, which is concerned with acquiring a range of skills that enable independence in the home and the community. For this concept presentation, functional ability is defined as the *cognitive, social, physical, and emotional ability to carry on the everyday activities of life.*[5] Functional ability may differ from functional performance, which refers to the actual daily activities carried out by an individual. Functional impairment and disability refer to varying degrees of an individual's inability to perform the tasks required to complete normal life activities without assistance.

SCOPE

The scope of functional ability represents a continuum from full function to disability (Fig. 2.1). This simple linear perspective acknowledges that functional capacity is a continuum that varies from person to person and within the same person at different points in time. Additionally, gender differences in body composition, especially muscle mass and adiposity, can affect functional ability. Men, compared with women, have more muscle strength and functional performance but have a faster rate of functional decline as they age. Conversely, women live longer with a slower rate of functional decline but have more significant disability. However, the interaction between an individual's health and disability is a complex process influenced by developmental and biologic factors, including the current state of health and psychological, sociocultural, environmental, and economic factors. Within the conceptual framework of physical functioning, the term *function* refers to the positive or neutral interaction between a person's health condition and ability to perform social or physical activities including environmental factors and behavior strategies to compensate.[6,7] At the other end of the spectrum, *disability* refers to the negative aspects of a person's health condition and social or physical limitations. *Impairment* refers to the physical abnormality that underlies these limitations and is caused by some disease process.[7] The scope of conceptualizing function as a complex process that changes based on life span, health, and environment is essential to nursing care and assessment across the entire life course from birth to death.

Life Span Considerations

Functional ability changes across the life span as a function of development (occurring predominantly during the infant, toddler, preschool, school age, adolescent, and young adult developmental stages). However, changes in the environment, lifestyle, and technology require continued development of

FIG. 2.1 Scope of Concept Functional Ability Ranges From Full Function to Disability.

functional skills across the entire life span. In infants and young children, the expected development of functional ability is indicated by the achievement of unique developmental milestones. Specialized age-appropriate tests of development are used when indicated to determine developmental delays (see Concept 1, Development). During young and middle adulthood, identifying problems with functional ability requires careful assessment of each developmental milestone. For older adults, functional status ordinarily refers to the safe, effective performance of activities of daily living (ADLs) essential for independent living.[8] For this age group, intentional screening focused on factors contributing to a decline in functional ability is critical for maintaining independence. A comprehensive, interprofessional assessment focused on observed functional, social, or cognition changes should be performed for all individuals not exclusive of the environment (institutionalized or community-dwelling) or disease state.

ATTRIBUTES AND CRITERIA

Functional ability has two dimensions: attributes and antecedents. Attributes are defining characteristics of functional ability, and antecedents are events that must happen before functional ability can exist. Attributes of functional capacity include the following:

- The capacity to perform specific functional abilities
- The actual or required performance of functional abilities

Antecedents of functional capacity include the following:

- Development of physiologic process: neural, cognitive, endocrine, musculoskeletal, and metabolic
- Acquisition of developmental milestones and skills

At any given time, an individual with the capacity to perform a self-care activity may not complete that activity because of developmental, cultural, environmental, or social factors. Functional ability is further characterized by stages or series of successive changes in capacity or performance. It is not simply a matter of whether the individual *can* or *does* perform the activity but, instead, under what circumstances, with what type and amount of assistance, in what length of time, and with what degree of effort the person *can* or *does* perform the activity. All aspects of this concept presentation are based on these attributes and antecedent principles.

THEORETICAL LINKS

Functional ability is essential throughout life because it is a major contributing factor to the quality of life an individual experiences. It allows independence and participation in activities that are fulfilling to human nature. Functional ability is a vital concept to healthcare providers because it can indicate the existence and severity of disease, signal the need for services, monitor the success of treatment/disease progression, and facilitate cost-effectiveness in providing care.[9] Several theories can be used to translate the complex interaction and dynamic process of functional ability across the life course.

A nursing model with the concept of functional ability is the cornerstone of the *Roper-Logan-Tierney model of nursing.* According to this model, 12 ADLs are central to human life; these are presented in Box 2.1. This model was developed in Edinburgh and used throughout Europe and many other areas of the world to guide nursing education and practice by providing a framework to organize and individualize care. It focuses on health rather than illness and promotes care toward health promotion and wellness. Ongoing patient assessment and facilitation of independence in the patient's normal activities of living are central to the model.[10,11]

The International Classification of Functioning, Disability, and Health (ICF) is a framework created by WHO to describe this dynamic (rather than linear) process that occurs between functional ability and disability (Fig. 2.2).[12] The ICF focuses on the changes in functional level; these may be temporary (e.g., recovering from an illness or injury) or long-term (e.g., spinal cord injury). The ICF highlights the complex interactions of environment and personal factors and the effect they have on the domains of body function, activity, and the person's ability to participate in hobbies, sports, work, shopping, and driving. This criterion is used in the later featured exemplars to illustrate the complex dynamic process of impairment or limitation in the functional ability for specific health conditions.[12]

BOX 2.1 The 12 Activities of Daily Living According to the Roper-Logan-Tierney Model of Nursing

- Maintaining a safe environment
- Breathing
- Communication
- Mobilizing
- Eating and drinking
- Eliminating
- Personal cleansing and dressing
- Maintaining body temperature
- Working and playing
- Sleeping
- Expressing sexuality
- Dying

Data from Roper, N., & Logan, W. W. (2004). *The Roger–Logan–Tierney model of nursing: Based on activities of living.* London: Elsevier/Churchill-Livingstone.

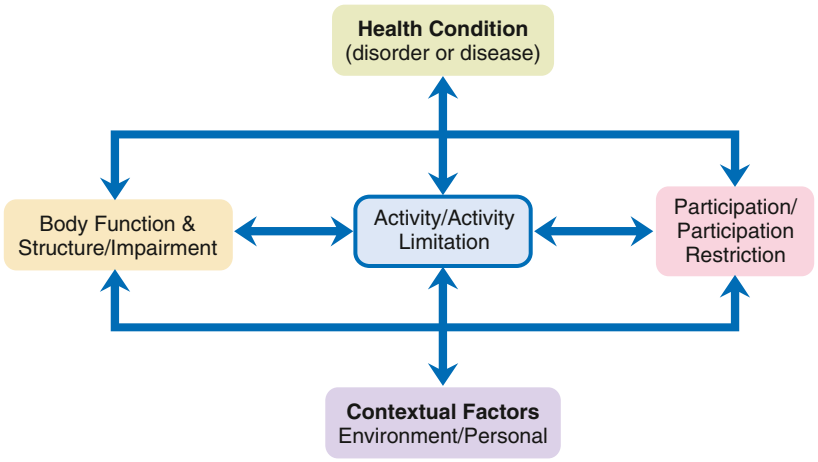

FIG. 2.2 The International Classification of Functioning, Disability and Health Model (ICF). (Redrawn from World Health Organization [WHO]. [2002]. *Towards a common language for functioning, disability and health.* Geneva: WHO. https://cdn.who.int/media/docs/default-source/classification/icf/icfbeginnersguide.pdf)

CORE COMPETENCIES

Functional Ability

- Perform clinical physical function assessments.
- Distinguish between normal and abnormal functional status findings.
- Synthesize functional assessment data in the context of the individual's current preferences, situation, and experience.
- Address individuals' experiences and perspectives in designing plans of care.
- Communicate findings of the functional assessment to the interdisciplinary care team.

CONTEXT TO NURSING AND HEALTH CARE

Nursing practice has three major dimensions of concern relative to an individual's functional ability: (1) risk recognition, (2) functional assessment, and (3) planning and delivery of individualized care appropriate to the level of functional ability. Functional ability is a complex concept representing the interaction of the human person's physical, psychological, cognitive, and social domains. Alterations in functional ability occur as primary or secondary problems. Primary problems are when the ability to perform a particular function is never developed. In contrast, secondary problems occur after functional ability has been attained. Thus, secondary problems represent a loss of functional ability.

Two examples of functional ability are the basic activities of daily living (BADLs or ADLs) and the instrumental activities of daily living (IADLs). The BADLs relate to personal care and mobility, including eating and hygienic and grooming activities such as bathing, mouth care, dressing, and toileting. IADLs are more complex skills that are essential to living in the community. IADLs include managing money, grocery shopping, cooking, house cleaning, doing laundry, taking medication, using the telephone, and accessing transportation. BADLs and IADLs are essential to independent living.[13]

Functional ability is a critical consideration in virtually all areas of health care and for all members of the healthcare team representing interprofessional interests. It is an essential element for discharge planning from healthcare facilities. Successful transitions in care from either one health facility to another or from a health facility to home depend on an individual's functional ability. Supportive services such as home care services, inpatient or outpatient rehabilitation services, or placement in a long-term care facility may be needed if functional ability is impaired. In the rehabilitation setting, the focus is on restoring functional ability and evaluating the functional outcomes of treatment by utilizing a functional assessment. For long-term care services, functional impairment—defined as *needing assistance with a minimum of two or three ADLs—is a standard eligibility criterion.*[14]

Risk Recognition

Risk recognition is essential to the early identification of factors that affect function. Actual functional deficiencies lead to subsequent mobilization of resources and support to enhance functional ability. Early identification is critical to the health status of individuals because research has shown that functional deficits are associated with poor health outcomes. In contrast, good functional ability is associated with positive outcomes. For example, a study of stroke patients revealed that significant predictors of independence 5 months after stroke were independent living status and independence in ADLs.[15]

There are multiple risk factors for impaired functional ability because of the numerous variables that affect function, including developmental abnormalities, physical or psychological trauma or disease, social and cultural factors, beliefs and perceptions of health, medications, and physical environment. Research has repeatedly documented medications,[16,17] cognitive function,[18] and level of depression[19] as risk factors for and predictors of functional impairment.

Medication use does not only imply protective effects but can also have negative effects on physical function. Negative effects come from drug–drug and drug–disease interactions, side effects, and/or inappropriate dosages of medications. For example, statin usage can induce severe side effects, such as myalgia or rhabdomyolysis,[20] beta-blockers modify muscular metabolic

properties and impair endurance exercise,[21] and other medications such as corticosteroids and chemotherapy drugs are associated to muscle weakness.[22] Comorbidities and socioeconomic factors have also been implicated. Preclinical disability, defined as *task modification without a report of difficulty performing a specific activity,* has also been an important predictor of future functional decline and disability in the elderly. In a study of postpartum women, those with postpartum depression (PPD) were 12 times less likely to achieve prepregnancy functional levels than those without PPD. PPD predicted lower personal, household, and social functioning without a deficit in infant care.[23] Sudden onset of functional decline is often indicative of acute illness or worsening of chronic disease.

Risk reduction should be the focus of care for patients with identified risks. Teaching patients and families about factors associated with the maintenance of high-level functional ability are required. These factors include well-balanced nutrition, physical activity, routine health checkups, stress management, regular participation in meaningful activity, and avoidance of tobacco and other substances associated with abuse.[24] In addition, patients need teaching and guidance to develop effective action plans designed to decrease their specific risks. Finally, ongoing assessment of an individual's functional ability can provide continual adjustment of recourses to maximize independence rather than dependence.

Functional Assessment

Comprehensive functional assessment is a time-intensive, interprofessional effort requiring the use of multiple assessment tools. Comprehensive functional assessment is indicated under specific circumstances. As discussed in Concept 1, Development, children who are delayed in meeting developmental milestones and accomplishing developmental tasks are referred for assessment across domains of development, including that of adaptive behavior, which is analogous to functional ability. Functional abilities are best assessed by observing the child's or adult's function. A comprehensive assessment of functional capacity in older adults is indicated when the individual has demonstrated a loss of functional ability, has experienced a change in mental status, has multiple health conditions, or is a frail older adult living in the community. Screening for functional deficits in older adults should be a part of routine care[24] just as screening for meeting developmental milestones is for children.

An individual's performance of ADLs helps determine functional capacity. ADLs as indicators of functional ability evolved in the late 1950s by identifying a group of basic physical activities, the performance of which was to be used to evaluate the success of rehabilitation programs. A decade later, IADLs are identified as indicators of the ability to live independently in the community. This led to the use of ADLs as a measure of need and eligibility for long-term care and other support services and the development of an array of assessment tools.

Assessment Tools

The two basic types of assessment tools are self-report and performance-based. Self-report instruments provide information about the patient's perception of functional ability, whereas performance-based tools involve actual observation of a standardized task, completion of which is judged by objective criteria. Performance-based assessments are preferred because they avoid the potential for inaccurate measurement inherent in self-report. Performance-based assessments provide a value that allows healthcare providers to quantify functional ability over time. These values are helpful in determining if there has been a change in function due to a significant event such as hospitalization, personal loss, or change in environment. Potential problems with self-report measures of functional activity stem from the effect of an individual's characteristics and preferences as well as environmental factors. Interpretation of what is meant by the question can vary from person to person. Even when vocabulary is correctly understood, the question's phrasing can lead to an ambiguous response. For example, if a person is asked, "Can you …?" the answer is based on the person's perception of ability to perform the task, not necessarily on actual functional ability. Thus, overstatements of functional ability may occur because of a lack of awareness that gradual changes in ability have occurred. Understatements of functional ability are possible when an individual has not attempted to perform the activity or mistakenly believes they cannot complete or perform the task. Functional ability can also be overreported or underreported by individuals based on personal or cultural reasons. Pride and the desire to be seen as self-sufficient, fear of losing independence, and fear of long-term care placement are common reasons for overstatement of ability, especially among elders. The 36-Item Short Form (SF-36) remains a "gold standard" instrument to measure older adults' physical, mental, and social domains.[25]

Meaningful measurement of functional ability also must address the areas of dependency and difficulty. Physical dependence refers to the amount of assistance needed to function, whether it involves the assistance of an adaptive device or another person. *No assistance, partial assistance,* and *total assistance* are examples of standard options related to dependency used when scoring functional assessment tools. Scoring options related to difficulty are *some, a lot,* or *unable to perform.* In addition to functional assessment tools that focus on complex, multidimensional abilities such as ADLs, there are tools designed to assess a specific area of function such as mental status, mobility status, or hand function. There are also tools designed for use with specific populations and age groups.[26–35] The Functional Analysis Screening Tool (FAST) is a 16-item questionnaire designed to measure social and behavioral functioning validated for assessing young adults.[34] The FAST measures domains of functioning related to injury (physical or emotional) risk and can provide a verbal report of symptoms. The limitation with behavior function-based scales is that primary behavior and motor stereotypes are maintained with labels. Therefore, such tools should simply be a way to gather information during a structured interview that focuses on target behaviors.[34]

Table 2.1 presents examples of the wide variety of functional assessment tools. Table 2.2 presents questions and observations associated with functional assessment.

TABLE 2.1 Examples of Functional Assessment Tools

Functional Assessment Tool	Function Assessed/Target Population
Barthel Index[30]	Activities of daily living
FIM Instrument	Self-care, sphincter control, transfers, locomotion, communication, and social cognition
Functional Independence Measure[31]	
Dartmouth COOP Functional Health Assessment Charts[32]	Adults: Comprehensive functional and social health Adolescents: Comprehensive functional and social health
Now, Growth & Development, Activities of Daily Living, General Health, Environment, and Documentation (NGAGED)[33]	Children ages 2–12 years with physical disabilities: Assesses engagement in life activities—personal, family, social, and school parameters
Functional Activities Questionnaire (FAQ)[34]	Older adults: Assesses IADLs
Folstein Mini-Mental Status Examination (MMSE)[35]	Older adults: Cognitive function
Long-Term Care Minimum Data Set (MDS)[36]	Nursing home residents
36-Item Short Form Survey (SF–36)[20]	Adult patients: Quality-of-life instrument to measure physical, mental, and social domains in older adults
Functional Status Scale (FSS)[26]	Hospitalized children
The Edmonton Functional Assessment Tool[37]	Cancer patients: Functional performance
24-h Functional Ability Questionnaire (24hFAQ)[21]	Outpatient postoperative patients: Functional ability
Geriatric Depression Scale[38]	Older adults: Depression
Inventory of Functional Status after Childbirth[18]	Postpartum women: Functional status

IADLs, Instrumental activities of daily living.

TABLE 2.2 Guide to Functional Assessment Screening

Functional Assessment Component	Sample Questions	Observations/Examinations
Vision	Do you have any difficulty seeing? Do you wear glasses or contact lenses? Do you use any special equipment to help you see, such as a high-intensity light or magnifying glass? When was your last eye exam?	Observe for signs of impaired vision during interaction with patient: turning head to one side in an effort to see better; nonapplicable comments about room seeming dark; feeling for items. Have patient hold a magazine or newspaper and read a line of print. Have patient read a wall clock or sign at a distance.
Hearing	Do you have difficulty hearing? Does anyone tell you that you are hard of hearing? Do you have to ask people to repeat what they say? Can you hear well in crowds? Can you hear when the area is noisy?	Note patient's apparent hearing during your interaction with him or her. Rub your thumb and forefinger together in front of each patient's ears; the patient should easily hear the sound.
Mobility	Do you have any trouble moving? Do you feel steady when you walk? Do you use anything to help you walk? Do you have trouble getting out of bed? Do you have difficulty sitting down or standing up?	Observe the patient's general movements; look for obvious movement limitations in any body part. Have patient put hands together behind neck and then behind waist to assess external and internal rotation of the shoulder. Assess lower extremity function, balance, and gait by asking the patient to arise from a straight back chair, stand still, walk across the room (approximately 10 feet), turn, walk back, and sit down. Note the ability to stand up and sit down; balance when sitting, standing, and walking; gait; and ability to turn.
Fall history	Have you had any falls? Have you had any near falls? Do you take any precautions against falling?	
Continence	Do you ever lose control of your bowels? Do you ever lose control of your urine and wet yourself? Do you wear any type of protective pad or underclothes with urine or bowels in case of an accident?	
Nutrition	Have you gained or lost 10 pounds in the past 6 months without trying? What do you typically eat in a day? Do you have difficulty chewing or swallowing? When was your last dental visit?	Note general appearance related to nutritional status: well nourished, undernourished, emaciated. Obtain weight and determine body mass index.
Cognition	Do you have any trouble with your memory?	Note patient's ability to respond appropriately to questions and directions. Three-item recall at 1 minute; if a patient fails this test, follow with MMSE.
Affect	Do you often feel anxious or overstressed? Do you often feel sad or down?	Note the patient's expression and if this matches their mood.

Continued

TABLE 2.2 Guide to Functional Assessment Screening—cont'd

Functional Assessment Component	Sample Questions	Observations/Examinations
Home environment	Who do you live with? What type of house do you have: single home, multiple family, apartment? How many floors does the home have? Are there stairs you must use?	
Social participation	What keeps you busy all day? How often do you go out? How often do you have company?	
Activities of Daily Living (basic and instrumental)	Use a reliable, valid assessment tool to assess function related to grooming, toileting, dressing, eating, walking, shopping, meal preparation, housekeeping, travel/driving, and money management.	

MMSE, Mini-Mental Status Examination.
From: Goldman, L. & Ausiello, D. (Eds). (2016). *Cecil medicine* (25th ed.). Philadelphia: Saunders; Kurlowicz, L., & Wallace, M. (1999). The mini mental status examination (MMSE). *Journal of Gerontological Nursing, 25*(5), 8–9; Sheikh, J. I., & Yesavage, J. A. (1986). Geriatric Depression Scale (GDS): Recent evidence and development of a shorter version. In *Clinical gerontology: A guide to assessment and intervention* (pp. 165–173). NY: The Haworth Press.

Care Delivery

Knowledge of an individual's functional level in the physical, social/emotional, cognitive, and communication dimensions is essential to planning and implementing effective patient care. Functional level determines the patient's need for assistance and the required type and amount of assistance. It guides the nurse in helping with activities while ensuring the use of adaptive equipment and maximizing the patient's independent function. This goal of optimal independent function as an outcome of care is preventing functional decline and improving health-related quality of life for individuals of all ages with chronic illness or disability.[44]

Management of functional activity impairment involves a multidisciplinary effort. Early intervention can include one or more of the following services: nursing, medicine, physical therapy, occupational therapy, psychological intervention, individual and/or family counseling, nutritional consulting, speech and language services, audiology services, home health or homemaker assistance, community services (e.g., adult or child care), support groups, and assistive technologies. Early intervention is critical when functional activity is impaired because, generally, the earlier the intervention, the better the outcome.[45]

INTERRELATED CONCEPTS

The human person is a complex integrated whole being requiring a holistic systems approach. Therefore, concepts used to describe aspects of the human person represent interrelated rather than isolated phenomena. The strength and direction of the effect of one conceptual phenomenon on another vary with the central concept under consideration. Because functional activity depends on the interplay of multiple elements within the physical, psychological, social, and cognitive dimensions and because it allows for purposeful interaction with the environment, many concepts can be identified as influencing and/or being influenced by it. Fig. 2.3 depicts the most prominent of these interrelationships. Concepts representing major influencing factors and hence determinants of functional ability are **Development, Cognition,** and **Culture,** with their unique variations in practices and expectations. These appear at the top of the diagram, and their influence on functional ability is indicated by the arrow pointing in the direction of this concept. **Family Dynamics** and **Stress and Coping**, as well as the physiologically focused concepts of **Mobility, Nutrition, Sensory Perception, Gas Exchange,** and **Perfusion**, have a clear reciprocal relationship with functional ability. These concepts surround either side of the concept with double-headed arrows because of their mutual interaction with it. The concepts of **Elimination** and **Sexuality** are shown at the bottom of the figure with arrows pointing from functional ability to them because of the primarily unidirectional relationship between these concepts.

CLINICAL EXEMPLARS

Alterations in functional ability may affect one specific area of function or may be global and affect widespread function. Impaired functional ability is often complex and may involve various environmental and individual factors. Furthermore, similar function alterations can result from very different causes.

There are multiple exemplars of situations that change an individual's functional ability. Examples of specific exemplars are presented in Box 2.2 using two major categories of problems for distinction: primary and secondary. Causes of primary issues of functional ability may be genetic in origin (i.e., the result of a congenital defect) or the result of trauma or disease occurring during the early years of development. Often, however, as with many developmental problems, the cause is unclear.

Secondary problems of functional activity are commonly identified as the result of aging, disease, trauma, or unfavorable environmental factors. Sudden onset of functional decline is a sign of acute illness such as pneumonia, urinary tract infection, or fluid and electrolyte imbalance. Alternatively, it can be a sign of worsening chronic disease such as diabetes, chronic obstructive pulmonary disease, or heart failure.[46] Depending on the extent of alteration in functional ability, the problem may be termed an impairment, a disability, or a handicap.

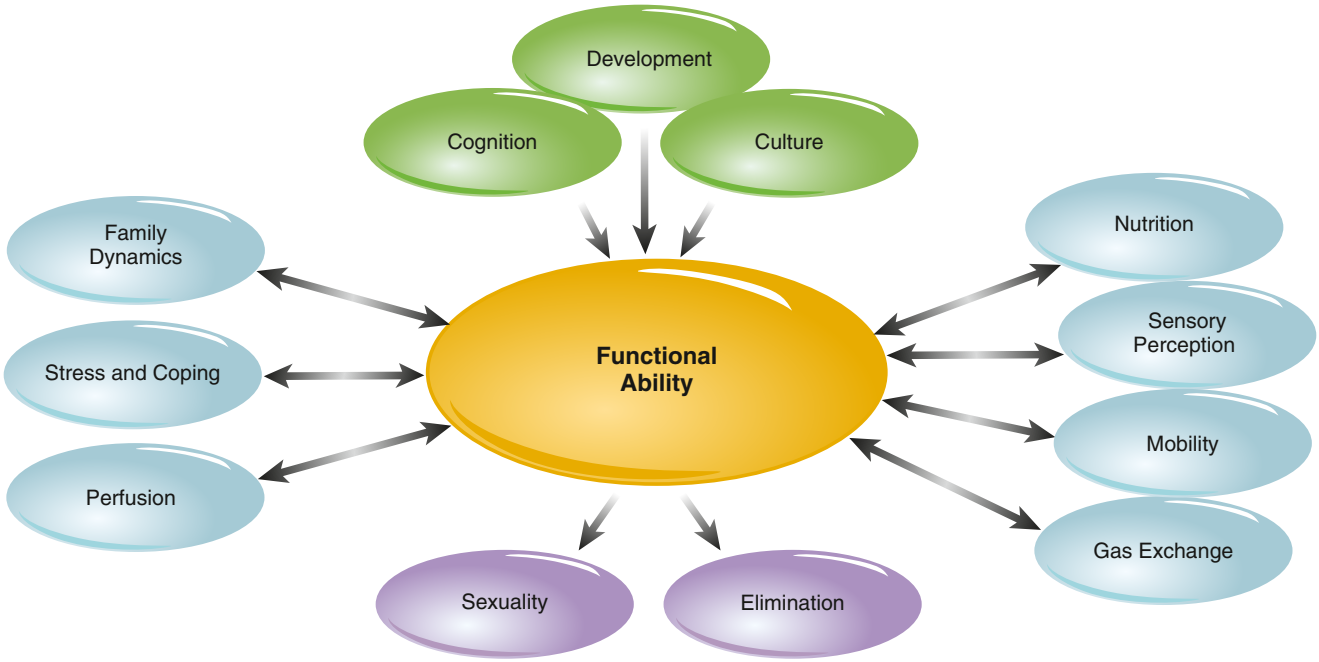

FIG. 2.3 Functional Ability and Interrelated Concepts.

BOX 2.2 EXEMPLARS OF IMPAIRED FUNCTIONAL ABILITY

Causes of Primary Problems

- Angelman syndrome
- Autism spectrum disorder
- Cerebral palsy
- Down syndrome
- Duchenne muscular dystrophy
- Fetal alcohol syndrome
- Hypoplastic limb
- Malnutrition
- Receptive or expressive language disorder

Causes of Secondary Problems

- Alzheimer's disease
- Blindness
- Brain injury
- Cardiovascular disease
- Chronic pain
- Chronic fatigue
- Chronic obstructive pulmonary disease
- Deafness
- Malnutrition
- Multiple sclerosis
- Osteoarthritis
- Parkinson's disease
- Rheumatoid arthritis
- Schizophrenia
- Spinal cord injury
- Skeletal fracture
- Stroke

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Featured Exemplars

Cerebral Palsy

Cerebral palsy (CP) is a group of neurologic disorders affecting body movement, posture, and muscle coordination. It is caused by abnormal development or injury to the developing brain in the area responsible for muscle control. This disorder occurs before birth, during the birth process, or within the first years of childhood and represents the most common motor disability in childhood. There are four main types of CP (spastic, dyskinetic, ataxic, and mixed CP); thus, the severity of symptoms is highly variable. Prevalence estimates of CP range from 1 to 4.5 per 1000 births.[47]

Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a broad category of conditions with a wide range of impairments and disabilities affecting early childhood children. Two general areas of dysfunction are social impairment and repetitive behaviors. Although the cause is not well understood, it is suspected that genetic and environmental factors may be involved. ASD represents a primary problem in functional ability because affected individuals have difficulties meeting BADLs or IADLs. The Centers for Disease Control and Prevention (CDC) estimates that 1 in 68 children have ASD; the rate in males is four or five times higher than in females.[48]

Alzheimer's Disease

Alzheimer's disease, an irreversible, progressive brain disease, is the most common cause of dementia among older adults, affecting an estimated 5 million in the United States.[49] This disorder

is characterized by the loss of cognitive functioning (memory, thinking, reasoning, and problem-solving) and behavioral changes resulting in a decline in functional ability. The degree of symptoms and functional limitations is directly related to the progression of the disease. Because this occurs in older adults, it is considered a secondary problem in functional ability.

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a systemic autoimmune condition with a genetic predisposition that creates an inflammatory process in the synovial membrane of the joints and other body tissues. Over time, the joint inflammation leads to erosion of the membrane cartilage, causing pain, swelling, and joint deformity; significant impairment in functional ability and mobility results. Affecting less than 1% of the general population, RA is most common among women and individuals older than age 60 years.[50] This is considered a secondary problem in functional ability.

Parkinson's Disease

Parkinson's disease (PD) is a neurologic disorder caused by a loss of dopamine-producing cells in the brain resulting in motor disability. Four primary symptoms are tremors, rigidity, bradykinesia, and impaired balance and coordination. This condition most commonly occurs in adults older than age 50 years, with a higher incidence among men than women. Although symptoms are subtle and mild initially, these become more pronounced as the disease progresses and interfere with functional ability.[51] An estimated 1 million Americans have PD, with an estimated 50,000 to 60,000 new cases of PD diagnosed each year.

CASE STUDY

From Kirstyokeeffe/iStock/Thinkstock.

Case Presentation

Mrs. Rose Finney is an 85-year-old woman with ovarian cancer. She presented at the oncology clinic for a scheduled appointment 6 weeks after surgical removal of her ovaries, uterus, a section of the large bowel, and as much tumor mass as possible from other areas of her abdomen. The purpose of the visit was a postoperative checkup and planning for chemotherapy. Mrs. Finney was accompanied by a niece with whom she had stayed while recovering from the surgery. The niece lives out of state, and the patient will be returning to her own home after this follow-up appointment. At this visit, the nurse interviewed the patient to obtain detailed self-report information related to functional ability. The following information was gathered:

- Alert, well-groomed, well-spoken, fiercely independent older woman recuperating remarkably well from extensive surgery
- Uncontrolled glaucoma with limited vision in one eye; 20/80 vision with glasses in the other eye
- Slightly hard of hearing
- Arthritis in fingers, along with lack of strength, makes some tasks difficult (e.g., opening jars, using the telephone)
- Uncertain walking outdoors, particularly in unfamiliar areas and the ground is uneven; no assistive devices
- Medication: Synthroid every morning for 47 years
- Never married, no children
- Lives alone in a single home; the bedroom is on the first floor, but laundry facilities and garage area are on the basement level
- Does not drive
- Only living relatives in addition to the niece are two nephews: One lives out of state, and the other lives half an hour away
- Telephone contact with closer nephew daily, occasional visits, and trips for shopping and other errands
- Three friends in the neighborhood, each of whom calls or visits on average every 2 weeks

Case Analysis Questions

1. Based on the information provided, what functional challenges put Mrs. Finney at risk for injury?
2. In addition to managing risk factors within the home, what additional help does she need?
3. How would interdisciplinary healthcare team members be helpful to Mrs. Finney and her family?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 3

Family Dynamics

Kimberly Cornwell

The *family* has been viewed traditionally as the primary unit of socialization, the basic structural unit within a community. The family, both in configuration and function, has seen dramatic changes in the past few decades. This is largely due to economic, demographic, sociocultural, and technologic trends that influence family life and health.[1] A family is a group of people who are related by heredity, marriage, or living in the same household. Thus, a family consists of (1) parents and their children; (2) those related by blood, such as ancestors and descendants; or, in a less restricted definition, (3) any group living together as if they were related by blood. A family is who they say they are.

Person-centered care has been a long-held value in nursing. The integration of one's family into informed decision making, education, and support while recognizing the role of both the patient and family as members of the healthcare team is key. Nurses must understand and appreciate the ways in which family dynamics influence the delivery of health care to individuals as families are the foundation of social context and act either as a support system or demonstrate a lack of familial support. This concept presentation includes the definition, scope, attributes, theoretical links, and exemplars of concept in the context of professional nursing practice.

DEFINITION

The wide variability in the configurations of families and the experiences individuals have within families makes it impossible to achieve a universally agreed-upon definition of family. However, the simple definition offered by Kaakinen is helpful: "Family refers to two or more individuals who depend on one another for emotional, physical, and economic support. The members of the family are self-defined."[2]

There are a variety of family configurations: the nuclear family, married-parent families, extended families, married-blended families, cohabiting-parent families, single-parent families, foster parent families, no-parent families, lesbian, gay, bisexual and transgender (LGBT) families, and childless families. These are not mutually exclusive classifications. For example, gay couples with children can be represented by the classification of married-parent family, cohabitating-parent family, and married-blended family. For this reason, it is again important to emphasize that a family is who they say they are

Family dynamics is a term that refers to how families interact and behave with one another. For the purposes of this concept presentation, the term family dynamics is defined as *interrelationships between and among individual family members or "the forces at work within a family that produce particular behaviors or symptoms."*[3, p.682] The dynamic is created by the way in which a family lives and interacts with one another. That dynamic—whether positive or negative, supportive or destructive, nurturing or damaging—changes who people are and influences how they view and interact with the world outside of the family. Influences on family dynamics are many and varied. These include such factors as the family configuration, relationship between the parents, number of children in the family, parental presence or absence, other people living in the home, chronic illness, disability, substance abuse, physical abuse, death, culture, socioeconomic status, unemployment, family values, and parenting practices.

When examining family dynamics, ages within the family should be considered. Young people often have ideas at variance with their parents. Grandparents will likely have views different from those of their grandchildren. The history of the people in the family is important. When a couple marries, they bring with them the culture and norms of their family of origin. This will influence the family dynamics. The role each member plays in the family is significant; it may be important to exchange roles to increase understanding among family members and decrease resentment.

SCOPE

Currently, one emphasis in nursing is providing wellness-oriented family-centered care and empowering families to achieve control over their lives. As discussed, families are included as members of the healthcare team and are part of the unit of care.

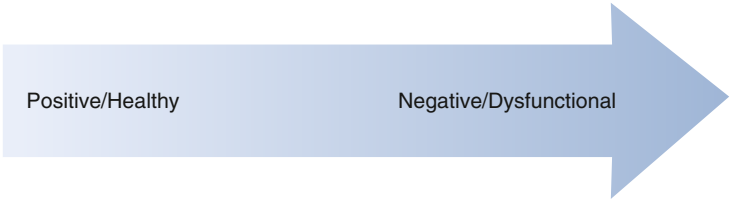

FIG. 3.1 Scope of Concept on a Continuum from Positive/Healthy to Negative/Dysfunctional.

Wherever nurses practice, they will work with families and observe family dynamics across the life span. Family dynamics occur between couples, with parents and children, and with extended family members. As implied by the word "dynamic," the interactions between family members are fluid and change with growth and development, time, and circumstances. Thus, the scope of family dynamics ranges from positive/healthy to negative/dysfunctional (Fig. 3.1) and is shown on a continuum because these dynamics evolve and change over time.

Common traits of families that are positive and healthy include positive and balanced communication and interactions among family members; support, respect, trust, and shared responsibilities; shared rituals, traditions, and religious core; strong sense of right and wrong; sense of play and humor; and shared leisure time.[4] Dysfunctional family dynamics refers to "Family functioning which fails to support the well-being of its members."[5, p.290] Traits associated with dysfunctional family dynamics include behavioral (such as blame, criticizing, enabling, manipulation, power struggles, apathy, and perfectionism), emotional (such as anger, fear, depression, loneliness, mistrust, and rejection), and relational (such as change/disruption in role, denial, neglect, triangulation, and lack of boundaries).

Multiple variables influence family dynamics. Three key variables include the quality of relationships among family members, the roles of family members (and these change over time), and the evolving complexity of the family. These three variables are explored further.

Quality of Relationships

Positive, healthy family dynamics are characterized by relationships that are loving and respectful. Family members support each other, provide nurturance and assistance, and form a unit within society. Family interactions and communications can become negative and dysfunctional as a result of social isolation, perceptions that are inaccurate, and faulty personal interpretations of information.[3] A husband may berate his wife for perceived shortcomings or denigrate a child for having difficulty with school. Siblings may squabble and place blame for incidents. In some instances, a parent and siblings may abuse one child. Observing dysfunctional interactions and communication patterns of their parents can lead children to imitate those negative behaviors.

Roles of Family Members

Within the family, individuals assume or are assigned roles: spouse, parent, child, sibling, grandchild, disciplinarian, leader, scapegoat, nurturer, enabler, hero, and so on. Healthy families are able to adapt and adjust to roles that may change over time. For example, as children grow and develop, crises are encountered, illnesses develop, or family members leave home. It may be difficult for family members, especially children, to understand roles, changes in roles, the way changes affect the balance of relationships within the family, and the effects of one family member's actions on the remainder of the family.

Evolving Complexity of the Family

The dynamics change between a married couple when their first child is born. This is because the dynamics in a triad are more complex than those in a dyad (Fig. 3.2); further increases in complexity occur when additional children are born. Extended family relationships add to the complexity, as do divorce, remarriage, and stepchildren. Same-sex families may not be accepted by, or may be estranged from, their families of origin, which precludes receiving support from them. In times of illness and stress, family interactions may change—sometimes for the better and sometimes for the worse. Family members can express concern for the ill member; extended family may gather to provide assistance and support. Old quarrels can be resolved, hurts can be forgiven, love can be expressed, and memories can be shared. At other times, quarrels can arise over past slights, the perceived or real burdens of caregiving, and the strain on family finances. Ill family members can become more demanding, believing they deserve special treatment and care. Death must be faced, burial details settled, and assets divided.

ATTRIBUTES AND CRITERIA

Defining attributes of family dynamics include the following:

- Family (however that is defined) is involved.
- The group of people, the family, have relational obligations.
- Communication, verbal or nonverbal, among family members occurs.
- Interactions among family members are fluid, flexible, and changeable (dynamic).
- A response to the external world.

The family, whether a couple or a multigenerational group, communicates and interacts. The more members involved, the greater the complexity of interaction and communication. Communication and interaction are dynamic and changing and can be positive or negative. Positive interactions and communications are growth-producing and create cohesion. Negative interactions and communications are divisive and disruptive and lead to dysfunction and alienation. The family unit and its dynamics also influence how the family views and interacts with the world outside of the family. Therefore, acknowledging these differing worldviews and the diversity of the family unit is key to understanding specific family dynamics.

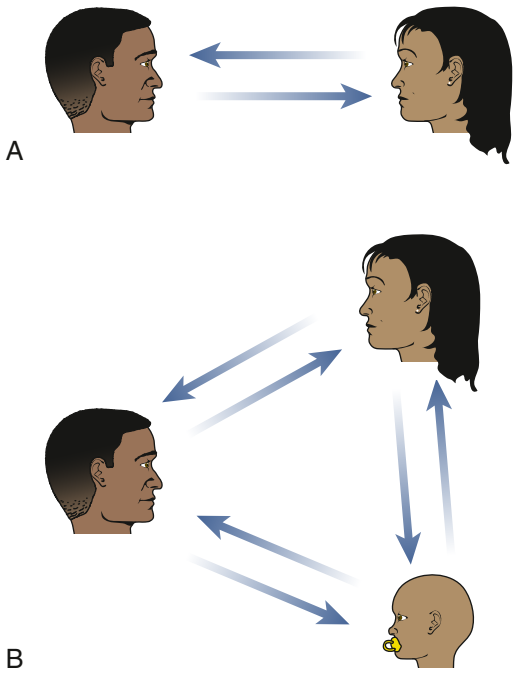

FIG. 3.2 Complexity of Relationships Within the Family. (A) Dyad. (B) Triad.

THEORETICAL LINKS

There are multiple theoretical approaches to guide assessment and interventions with the family. Due to the complex nature of the family, there is no single theory, model or conceptual framework that is fully comprehensive or better than another.[2] Theoretical approaches are often developed to help the nurse better understand the dynamics of the family. The following four theories provide a foundation for an integrated approach to the care of the family.

Family Systems Theory

Family systems theory is described as allowing nurses to "view the family as a unit and, thus, focus on observing the interaction among family members, and between the family and the illness or problem rather than studying family members individually."[6, p.26] The following are key characteristics of family systems theory: (1) A family system is part of a larger suprasystem and is composed of many subsystems, (2) the family as a whole is greater than the sum of its individual members, (3) a change in one family member affects all family members, (4) the family is able to create a balance between change and stability, and (5) family members' behaviors are best understood from a view of circular rather than linear causality.[6]

Because a change in one family member affects all family members, a change in family dynamics occurs. Consider the following situation:

When Tama, a mother of three children gives birth to her fourth child, the father and the siblings of the baby experience change, and the relationships among the members of the family change. The father, Peter, has to assume additional responsibilities for care of the family while the mother recuperates from the birth. He can prepare meals and do laundry; he can assume some care of the newborn. Siblings must share their mother's love and time with this new member; sibling rivalry may occur. The family attempts to balance these changes and restore stability. As the newborn is incorporated into the family, the siblings resume their previous activities. Because one family member changes, the family changes, and in turn this change affects the member who changed (circular causality). The mother is now the mother of four children, with the additional responsibilities of caring for a newborn and three other children while maintaining her relationship with her partner.

Structural-Functional Theory

Structural-functional theory is rooted in social anthropology and views society as a complex system of working parts to promote stability.[7-8] Family members have specific roles, such as the father role, mother role, and daughter or son role. Maintaining equilibrium between complementary roles is accomplished through family dynamics. This permits the family to function within the family unit and in society. Some families establish rigid boundaries, and outsiders are kept at a distance. Some families may be isolated and may find that in times of crisis their resources are inadequate. Other families maintain open boundaries and give and accept assistance when needed. Some reciprocal relationships within the family can be detrimental, such as designating one member as the family scapegoat or viewing another family member as weak or dependent. Another family member may be identified as the strong or responsible one, and undue expectations may be placed on that member.

Family Stress Theory

The focus of the family stress theory is on the way families react to stress.[9] When faced with a significant stressful event, some families adapt and other families deteriorate; the response is driven by a number of variables, including how the stressor is perceived, other stressors that may also be affecting the family, the resilience of the family as a unit, as well as among individual members, the level of commitment family members have to one another, and availability and accessibility of resources.

Stress of families can also be studied in the contexts in which the family is living, both internal and external. Internal context events are those that the family can change or control (e.g., family structure, psychological defenses, and philosophic values and beliefs). The external context is composed of the time and place in which a family finds itself and over which the family has no control (e.g., culture of the larger society, time in history, economic state of society, maturity of the individuals involved, success of the family in coping with stressors, and genetic inheritance). As an example, the way in which a family initially responded to the stress to the COVID-19 pandemic was influenced both by internal contexts such as family views on vaccination and vulnerable populations living in the home as well as external contexts such as economic inflation and family history of mental illness.

Family Life Cycle (Developmental) Theory

Families pass through stages. Relationships among family members move through transitions. Although families have roles and functions, a family's main value is in relationships that are irreplaceable.

Developmental changes to the family are part of the life-cycle process, but they also represent adjustments that must be made within the family.[10] The family must be able to adapt to these changes to avoid dysfunction. As an example, a couple who goes through stages of dating and then forms a family initially have an exclusive relationship with one another. The relationships change when the family expands and the couple becomes parents to a child. When another child is introduced to the family, the relationships expand. The firstborn child relinquishes his or her role as an only child and develops a relationship with the sibling. The complexity of relationships increased exponentially as the size of the family increased. Children grow and develop within the family and expand the cycle of their relationships through play groups, school, church, and social club activities. As they mature and change, family relationships will change. As time goes on, the couple grows older and relinquishes their places as primary in the lives of their children. Role reversals may occur as they age; their children as adults may need to care for them and, eventually, deal with their deaths.

CONTEXT TO NURSING AND HEALTH CARE

The family influences and is influenced by other people and institutions. This plays a pivotal role in health care. Family-centered care is a standard way to approach the delivery of health care. This care is based on recognizing that patients and their families are important partners in ensuring both the quality and safety of nursing care. There are many situations in which the nurse interacts with the family while providing care. Understanding family dynamics, how these dynamics can change over the course of an illness and how these dynamics influence the health of the patient is important to nurses for the provision of quality nursing care.[11] The family, whether present or absent, influences the patient, either positively or negatively. For nurses to be effective in their care of the family, they must be skilled at conducting a family assessment (including risk recognition) and planning and delivering care appropriate to the situation.

Risk Recognition

During interactions with patients and families, nurses must recognize situations that place families at risk for dysfunction—several situations place families at risk. Some of the most common include when the family expands, a situation whereby a family member violates the trust of one or more family members, loss of financial stability, abusive behaviors, substance use and addictions, a severe injury or illness, or death of a family member. Several disruptions and changes within the family may occur, including changes in roles and relationships of family members, the home and/or living arrangements, finances, priorities, and obligations. These may occur singularly, but in many cases, one issue leads to another or are corelated. As one example, a family member who provides the primary financial support hides a drinking problem from her partner. Due to her addiction, she loses her job, and the family is unable to pay outstanding bills. In this scenario, a violation of trust and loss of financial stability occur as a result of the addiction.

Conducting a Family Assessment

Several culturally sensitive tools have been developed to assess or measure family dynamics (Table 3.1). These and other models are often used in studies of family dynamics. The following example uses the Calgary Family Assessment Model (CFAM) [6] to illustrate a system of family assessment.

The CFAM is widely used by nurses as a guide to assess families. Wright and Leahy caution that the nurse must recognize that such an assessment is based on the perspective of the nurse (based on personal and professional life experiences) and interactions with interviewees. The assessment is not "the truth" about the family but is just one perspective, that of the nurse, in that instance.

TABLE 3.1 Models and Tools to Assess Family Dynamics

Model	Purpose/Description
Calgary Family Assessment Model[6]	A multidimensional framework with three major categories: *structural, developmental,* and *functional.* It is embedded in larger worldviews of postmodernism, feminism, and biology of cognition. Theory foundation of model includes systems, cybernetics, communication, and change. Diversity issues are included.
Circumplex Model of Marital & Family Systems[16]	Family model grounded in family systems theory. Includes dimensions of *family cohesion* (emotional bonding that couple and family members have toward one another), *flexibility* (amount of change in its leadership, role relationships, and relationship rules), and *communication* (includes family as a group in relation to listening skills, speaking skills, self-disclosure, clarity, continuity tracking, and respect and regard).
Family Adaptability and Cohesion Evaluation Scales (FACES IV)[17]	Updated version of self-report scale designed to assess full range of cohesion and flexibility dimensions of Circumplex Model.
Dyadic Adjustment Scale[18]	Self-report 32-item questionnaire administered to both members of a couple. Scales include *dyadic consensus, dyadic satisfaction, affectional expression,* and *dyadic cohesion.*
Chinese Family Assessment Instrument (C-FAI)[19]	Self-report measure to assess family functioning in Chinese populations. Contains five dimensions: (1) *mutuality,* (2) *communication and cohesiveness,* (3) *conflict and harmony,* (4) *parental concern,* and (5) *parental control.*
Family Dynamics Measure II (FDM II)[20]	Based on eight bipolar dimensions of Barnhill.[21] First six of dimensions were selected for inclusion: (1) *individuation versus enmeshment,* (2) *mutuality versus isolation,* (3) *flexibility versus rigidity,* (4) *stability versus disorganization,* (5) *clear communication versus unclear or distorted communication,* and (6) *role compatibility versus role conflict.*

The model is used to ask family members questions about themselves to gain understanding of the structure, development, and function of the family unit at a point in time. Not every question is asked at the initial encounter as the interview is tailored to each family. Each subcategory contains multiple questions that may not be appropriate for all families, and too many questions could overwhelm a family and/or provide more data than is necessary for the assessment. Although individuals are interviewed, the focus of a family assessment is on the interaction among the individuals in the family.

The three major categories of the CFAM are structural, developmental, and functional.[6] There are several subcategories for each category. In this brief explanation of the model, only the major categories are addressed.

Structural Assessment

Gaining an understanding regarding the family structure and function is the first step toward understanding the interactions within the family. Assessment of the structure of the family includes determining the members of the family, the relationship among family members in contrast to relationships with those outside the family, and the context of the family. Questions to assess the structure include the following:

- Who is in your family?
- Does anyone else live with you?
- Has anyone moved out recently?
- Is there anyone you think of as family who does not live with you?

Genograms and ecomaps are useful tools to outline both the family's internal structures such as family composition and rank order as well as the external structures of extended family and social systems. Software is available to construct these tools and even track family patterns. The ecomap provides a visual depiction of the personal relationships of the family members as well as their social interactions outside the family. The best tool to use can depend on the specific makeup of the family. An example of an ecomap is presented in Fig. 3.3, which shows that the family includes a 35-year-old male (shown as a square in center circle), a 33-year-old female (shown as a circle in center circle), and two children—a boy age 4 and a girl age 2 weeks (shown in center circle). In addition, several people with important relationships to members of the exemplar family are shown as purple circles (outside the center circle).

Developmental Assessment

Most nurses are knowledgeable about the stages of child development and adult development, and there is increasing literature about development during senior years. However, family development is more than the concurrent development of individuals in a family and is different from family life cycle. Family development considers the changing circumstances of living with both predictable and unpredictable events. Family life cycle describes the typical trajectory followed by most families. The CFAM uses family life cycle to organize the assessment of family development.[6]

Functional Assessment of Family Relationships

Functional assessment addresses how individuals within the family behave in relation to one another. The two basic aspects of family functioning are instrumental and expressive. Instrumental aspects include routine activities of daily living, such as preparing meals, eating, sleeping, doing laundry, and changing dressings. Expressive aspects include communication (emotional, verbal, nonverbal, and circular), problem

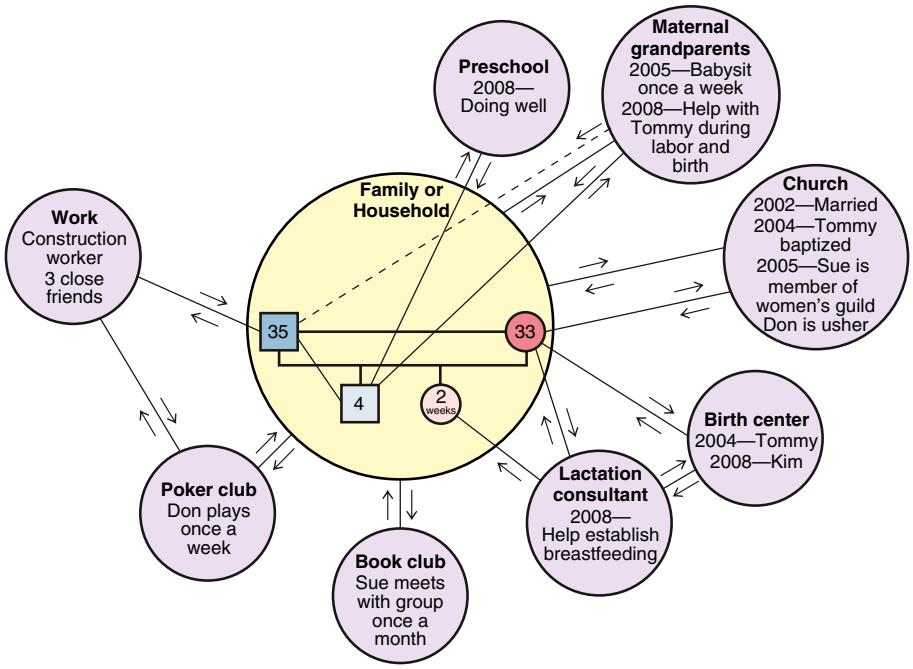

FIG. 3.3 Example of Ecomap Describing Social Relationships and Depicting Available Supports. (From Lowdermilk, D. L., Perry, S. E., Cashion, K., & Alden, K. R. [2020]. *Maternity and women's health care* [12th ed.]. St Louis: Elsevier.)

BOX 3.1 Core Interventions

- Providing education
- Facilitating conversations
- Enhancing understandings
- Sharing observations
- Validating information, perceptions, or feelings

solving, roles, influence and power, beliefs, and alliances and coalitions.[6] The categories are not used to define a family's emotional health; it is the family's judgment of whether they are functioning well that is important, and nurses are encouraged to use the family's view of health and not impose their own.

Care Delivery

Conducting a family assessment and assessing for risks (discussed earlier) are used to determine the current state of a family's function (positive to negative family dynamics). This assessment is used to determine appropriate goals and interventions. Interventions exist to support positive family dynamics and intervene when family dynamics become dysfunctional. Understanding the quality and appropriateness of family dynamics enables nurses to work with families to set goals, create a plan of care, and provide that care while continuing to assess the family. Evaluation of the plan provides the opportunity to make any changes necessary based on observed dynamics of communication and interactions of the family. The nurse's scope of practice, context of the practice setting, complexity of the issues identified, and experience in family-centered care will influence the interventions offered. In some cases, the nurse will identify appropriate referrals; in other cases, the nurse may offer interventions directly. Timely, complete, and accurate information is important to allow families to be active participants in their care. Furthermore, the family's openness to interventions offered by the nurse (or other healthcare providers) is influenced by the relationship and level of trust between the family members, the nurse, and other healthcare professionals.

Core Interventions

Core interventions to support families are those that all nurses, regardless of area of practice, should be able to offer. This requires nurses to interact with family members present during caregiving, ask about those who may be absent, and actively listen to words while noting expressions to facilitate understanding.[1] Goals are first determined by the family with the support of the nurse, and then interventions to reach those goals are applied. Core interventions include offering education, facilitating conversation among family members, enhancing understandings, sharing observations, and validating information, perceptions, or feelings (Box 3.1). These may initially seem rather simple; however, the complexity becomes clearer when considering that interventions must be tailored to the specific situation and context. Every family and every situation are different; thus, the intervention is uniquely applied. In addition, nurses must avoid falling into the trap of thinking, "I know what is best for the family." Such an attitude generally does not resonate with families and negatively affects the effectiveness of goals and interactions that could be helpful. Positive rapport and trust must be established and maintained, with an underlying acceptance of the family and their values.

Advanced Interventions

When family dynamics are dysfunctional, significant complexity may exist, making it difficult to determine what is needed and the interventions to offer. In addition to the core interventions (listed earlier), advanced interventions may also be needed. Advanced interventions are carried out by healthcare professionals (nurses, physicians, social workers, psychologists, etc.) with expertise working with families.

Intervening questions. As part of the Calgary Family Intervention Model, interventive questions refer to a systematic approach to introducing questions to the family with the intent to elicit change in three domains of family functioning: cognitive, affective, and behavioral.[6] A collaborative approach between the nurse and the family is key when asking interventional questions. Two types of interventive questions include linear and circular. *Linear questions* are used to provide the nurse additional information to better understand the problems the family is experiencing; they tend to direct the conversation for information gathering and tend to focus on cause and effect. As an example, a family consisting of two adults and three children has a young child, Dylan, with a diagnosis of cancer. His prognosis is poor. Since Dylan's diagnosis, the interactions among family members have become dysfunctional. Directed questions might include:

- When did Dylan's illness first affect the family?
- What specific situations following his diagnosis have been particularly challenging?

Circular questions aim to uncover an explanation of problems and the family's understanding of the problems. These also tend to tease out differences in relationships. Using the same previous scenario, circular questions might include:

- Who in the family is concerned about Dylan's illness and why?
- How have your family routines and interactions changed since Dylan's diagnosis?

There is an art to applying intervening questions. Like most things, it takes time, practice, and experience working with families. Common mistakes made when working with families include failing to create a context for change, taking sides or forming an alliance with one member or part of the family and giving advice too soon without consideration of the full scope of the situation.[6] Thus, the application of interventive questions is most effective among experienced nurses and other healthcare providers who specialize in family nursing.

Other advanced interventions. Several other interventions are offered for families. These interventions are dependent on situational factors within the family and the underlying issues. Examples include caregiving, family counseling, family therapy, psychiatric care, support groups, palliative care, and hospice. Each of these are interventions beyond the scope of this concept presentation but are addressed throughout this book and from other resources.

CORE COMPETENCIES

Family Dynamics

- Engage with the family in establishing a caring and trusting relationship.
- Acknowledge personally held attitudes about working with families from different ethnic, cultural, and social backgrounds.
- Draw from multiple theoretical foundations to evaluate family dynamics.
- Use evidence-based tools or models to conduct a family assessment.
- Recognize when dysfunctional dynamics may be occurring within a family structure.
- Develop a plan of care that supports positive family dynamics.
- Discern when additional expertise and knowledge is needed to design interventions for the family.

INTERRELATED CONCEPTS

The following concepts are related to family dynamics. Fig. 3.4 illustrates how these concepts are related.

A fundamental purpose of a family is **Reproduction**. The addition of children, whether by birth, adoption, or blending of families, increases the complexity of interactions in a family, introduces stress, and provides the potential for growth and maturation. Infertility creates different stresses through inability to have desired children, through the many tests and procedures undergone to ascertain the cause of the infertility, or through the procedures to try to achieve pregnancy. **Development** affects the number and type of interactions within a family and influences the complexity of those interactions. Infants are born; children grow and leave home; marriages occur; parents age and die. Families expand and contract consequently, and family dynamics readjust with each of those changes. The presence or absence of the **Functional Ability** of family members affects the self-concept of the family members lacking that ability, and it places stress on the members of the family who are expected to assist or serve in a caregiving role. Whether the assistance is offered or not, resentment can occur and lead to dysfunction in the family. **Stress and Coping** is a common concept because of the multitude of challenges faced by one or more members of the family. Stress may occur when a member of the family develops an illness or health-related condition; it may exist temporarily (as with an acute illness or injury) or for a lifetime (as with a chronic condition). Effective coping from within family can provide a source of support for the family member experiencing stress or, conversely, add to the stress by the family's lack of support. **Person-Centered Care** is a concept that encourages active collaboration and shared decision making between patients, families, and providers. Recognizing the influence that the family has on the patient and understanding how family structure, values, communication patterns, culture, and socioeconomic conditions affect the patient is key to providing person-centered care. **Culture** is passed from generation to generation and can affect relationships among family members; for example, the male is always the decision maker; childbirth is the affair of women. Second-generation members of the family may not share the values and customs of first-generation members. Culture has a direct effect on health behaviors. Beliefs, values, and attitudes that are culturally acquired may influence perceptions of illness, health care-seeking behavior, and response to treatment.

CLINICAL EXEMPLARS

Exemplars of positive and negative family dynamics as well as changes to family dynamics provide an opportunity to see the wide variety of situations in which family dynamics can be observed (see Box 3.2). The importance of understanding family dynamics when caring for families should lead the nurse to study the factors involved, practice observation of families, and learn appropriate

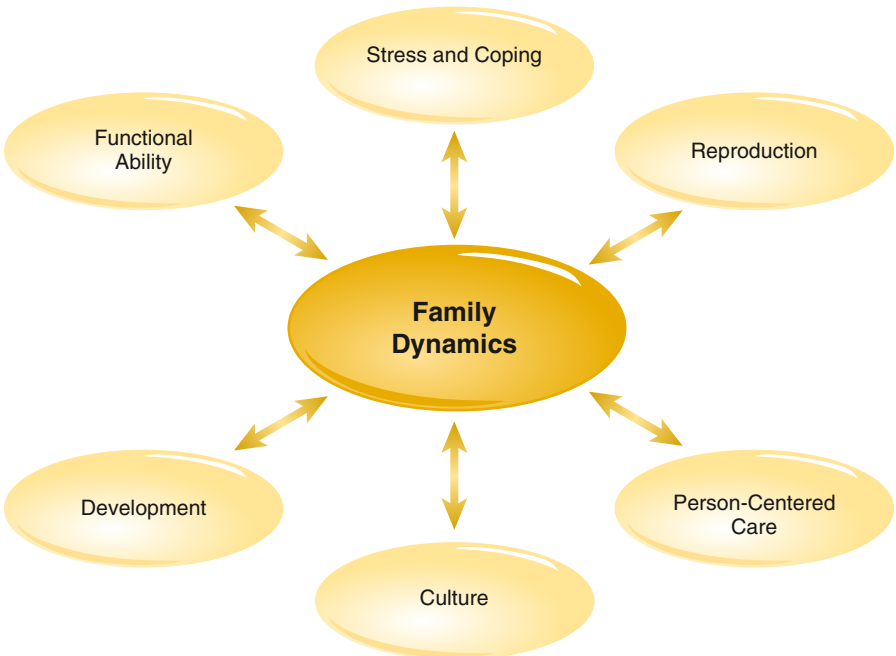

FIG. 3.4 Family Dynamics and Interrelated Concepts.

BOX 3.2 EXEMPLARS OF FAMILY DYNAMICS

Changes to Family Dynamics
- Expanding family (birth or adoption of an infant; blended family)
- Caregiver role for family member
- Change in socioeconomic status of family
- Chronic illness of family member
- Marriage, divorce/remarriage
- Traumatic injury of family member
- Disability of family member
- Aging of family members
- End-of-life care
- Death of family member

Positive Family Dynamics
- Assistance with child care after birth of new infant
- Respite care for a caregiver
- Support after injury or death of a spouse
- Presence during surgery
- Family reunions
- Celebrations of birthdays and other significant events
- Praying together
- Supportive in-laws
- Sharing care of a dependent family member
- Family support of gender diversity

Negative/Dysfunctional Family Dynamics
- Child abuse
- Codependency (related to substance abuse by a family member)
- Elder abuse and neglect
- Human trafficking
- Interfering in-laws
- Intimate partner violence
- Marital infidelity
- Placing blame for birth of a preterm infant or for death of a young child by SIDS
- Sibling rivalry
- Adolescent pregnancy

SIDS, Sudden infant death syndrome.

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

intervention techniques. A detailed discussion of each of these is beyond the scope of this text, but several important exemplars are briefly presented here. Refer to other references for further information about these exemplars and specific interventions for each.

Featured Exemplars

Expanding Family

The family expands by the birth or adoption of a child or by blending families with children through marriage or cohabitation. The family can also expand by incorporating parents or other extended family members. The complexity of communication and interaction is increased in these instances in proportion to the number of individuals involved.

Sibling Rivalry

Sibling rivalry is competition or animosity between and among siblings. It is common with the birth of an infant when the older child competes with the infant for the time and attention of a parent but is usually quickly outgrown. As children grow, the rivalry may be heightened, resulting in arguing and fighting. Sibling rivalry may persist into adulthood. At times, the rivalry is healthy, encouraging the siblings to excel. At other times, lifelong animosity may persist.

Intimate Partner Violence

Intimate partner violence is physical, sexual, emotional, or psychological abuse, threatened or actual, by a current or ex-spouse, current or ex-boyfriend or girlfriend, cohabiting partner, or date. Both women and men can be victims. It involves social isolation, emotional distress, and personal safety.[12]

Child Abuse

Child abuse is intentional physical or emotional abuse or neglect, including sexual abuse, of a child, usually by an adult. It is a significant social problem affecting children and can result in disability or death. Child abuse is significantly underreported, so actual incidence is unknown.

Codependency

Codependency is characterized by a relationship in which a person is controlled or manipulated by another who has an illness or addiction. It is a dysfunctional pattern of living and problem solving. It occurs in a setting in which there is addiction, physical or emotional abuse, neglect, or a dysfunction that causes pain and stress.[13-14]

Respite Care for a Caregiver

The physical, emotional, and financial consequences for the family caregiver can be overwhelming without support services, such as respite care. Respite care provides alternative care, for a period of time, so that a family caregiver can have time away from care responsibilities, thus reducing feelings of overload and stress in providing care. In doing so, caregivers can take time for themselves and potentially avoid the need to turn over their role as a caregiver.[15]

Aging of Family Members

For many people, healthy aging occurs with retention of their mental and physical capacities. For others, as they age, their capacities and roles may change. Disability and the need for care often come with aging. Hearing and sight may become impaired; mobility may decrease. The aged person may no longer be able to drive. Mental capacity and memory may decline. Adult children may have to provide care for their aging parents.

Death of a Family Member

As part of the cycle of life, family members will die. The death of an infant, child, young parent, middle-aged or older adult, or the aged will have different effects on the family. Tradition, culture, and spiritual beliefs will influence the response to death. Grief may be manifested in a variety of ways and may last a significant length of time.

CASE STUDY

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Case Presentation

Erin is a 22-year-old single parent with two children (Stacie, age 5 years, and Monica, age 2 years). Erin dropped out of high school to marry Andrew when she was 17 years old and pregnant. She recently divorced Andrew because of his drinking, numerous extramarital affairs, and lack of support of her and the children.

Andrew has a part-time job delivering pizza and spends most of his free time with friends. He only sporadically provides monetary support. Erin and the girls live in a small apartment. Because she has a minimum wage job, Erin relies on the Supplemental Nutrition Assistance Program (SNAP) and other types of support services. Child care and rent are major expenses, and Erin continually worries about being able to pay her bills. She would like to earn her GED to get a better job, but she lacks the time and resources to make that happen. Andrew sees the girls only occasionally—usually when Erin asks him to keep the girls so she can work extra shifts. He dislikes spending his time "babysitting" his daughters and openly verbalizes his frustration with the "whiny girls."

Erin has a strained relationship with her parents. They were angry when she became pregnant, they were against her dropping out of high school to get married, and they consider Andrew a "deadbeat." They do not help Erin financially, citing concerns for their own retirement. Although they live in the same community, they do not babysit the girls very often and have been critical of Erin's parenting style. Erin has always believed that her parents liked her older brother, Dominic, better. He is married and has three children who spend a great deal of time with Erin's and Dominic's parents. Dominic rarely interacts with Erin because they "don't have anything in common."

Recently after the girls spent time with their father, Erin noticed bruises on the arms and the buttocks of Monica. When she asked the girls what happened, Stacie said, "Daddy got mad when Monica wet her pants and spanked her." A week later, while at a free health clinic getting Stacie immunized for school, Erin shared with the nurse practitioner details of her life and situation: lack of money and support, working too many hours, fear of losing her apartment, and now—Andrew hurting Monica. She said she does not know what to do and began crying.

Case Analysis

1. How would you describe Erin's various families?
2. What findings are indicative of negative or dysfunctional family dynamics?
3. How should the nurse respond to Erin?

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CONCEPT 4

Culture

Susan Caplan

Human beings need to construct meaning from their experiences, and this construction or unifying world view is known as culture.[1] For most people, culture is defined by its outward manifestations—the foods people eat, the holidays they celebrate, and the countries from which they originate. However, culture encompasses much more. Culture forms a person's worldview and values, which, in turn, shapes his or her beliefs about health and illness. The concept of culture is an important aspect of understanding human behavior[2] and is a critical part of understanding how to provide person-centered nursing care.

DEFINITION

For the purpose of this concept presentation, culture is defined as *a pattern of shared attitudes, beliefs, self-definitions, norms, roles, and values that can occur among those who speak a particular language, live in a defined geographic region, or share a common lived experience*.[2] These dimensions guide such areas as social relationships; expression of thoughts, emotions, and values; spiritual and religious beliefs; and use of technology.

A discussion of culture includes the subconcepts of enculturation, acculturation, assimilation, biculturalism, ethnicity, and ethnic identity. *Enculturation* is the process of socialization or learning the norms, values, and behaviors of a culture. *Acculturation* is the process of acquiring new attitudes, roles, customs, or behaviors because of contact with another culture. Both the host culture and the culture of origin are changed as a result of reciprocal influences. Unlike acculturation, *assimilation* is a process by which a person gives up his or her original identity and develops a new cultural identity by becoming absorbed into the more dominant cultural group.[2] Usually, when a minority group or individual assimilates, they do not have a choice about what aspects of the dominant culture they will adopt; rather, the dominant culture's values and practices are imposed upon the less dominant group. In contrast, in the case of *biculturalism*, the individual has a dual pattern of identification and chooses which aspects of the new culture he or she wishes to adopt and which aspects of the individual's original culture he or she wishes to retain.

Ethnicity refers to a common ancestry that is reflected in shared values and beliefs. It is transmitted over generations by the family and community. Ethnicity is a powerful determinant of one's identity, known as *ethnic identity*. Race is sometimes thought of in biologic terms based on erroneous belief in the existence of human genetic variations that define membership in a particular group.[3] In fact, humans across all races share 99.9% of genetic codes.

SCOPE

The concept of culture is very broad and influences the shared beliefs, values, and behaviors of a group. Cultural norms affect all aspects of life, including everything from interpersonal relationships, family dynamics, and childrearing practices to gender roles, dietary preferences, communication, dress, and religious practices. Cultural norms also significantly influence how people make decisions about treatment preferences, medication adherence, self-care, which symptoms or signs are normal or indicative of illness, at what level of symptoms is functional status affected, when it is appropriate to occupy the sick role, and when to engage in help-seeking behaviors. Cultural norms even shape institutional norms and healthcare policy. The scope of these influences, in the context of health and illness, is illustrated in Fig. 4.1.

Causal Beliefs About Illness

Cultural differences can result in different explanations for illness.[4–6] In Western cultures the predominant theoretical model of health and illness is scientific rationality, or the biomedical model. The Western biomedical model of disease assumes that each disease has a specific etiology and disease represents a deviance from a measurable biologic variable. (Nurses and other healthcare providers who hold this worldview may fail to recognize that this model is one way of thinking about health and is only one picture or representation of reality.) In contrast, in non-Western cultures illness is conceptualized in terms of mind, body, spiritual and social connections, and imbalances within these realms.[5] In non-Western cultures, explanatory models of illness might include natural causes (e.g., bacteria,

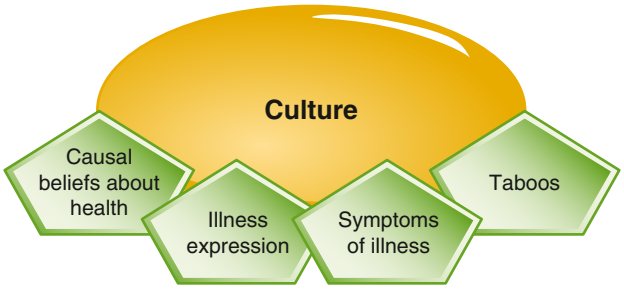

Fig. 4.1 Scope of Culture Related to Health Care.

viruses, climate, and environmental irritants), the social world (e.g., punishment for individual behaviors, moral failings, or negative social interactions), or the supernatural world (e.g., ancestral spirits and deities).

For example, Ayurvedic medicine, practiced in India, is a belief system that considers health to be a balance or equilibrium between five key natural elements: earth, water, fire, air, and space. Illness can be healed by restoring balance through the right combination of hot and cold foods. As another example, traditional Chinese medicine is concerned with an imbalance of the two cosmic forces of *Yin* and *Yang*. Natural elements are aligned with specific body organs and functions, and restoring imbalances can be aided with hot and cold foods, herbs, and acupuncture.[7]

Symptoms and Expression of Illness

The manifestations and symptoms of illness can be unique for different cultures or geographic regions. These cultural differences in expressions of illness are often unrecognized by Western trained medical providers and can result in greater health inequalities in access to treatment. Labels applied to differences in manifestations of illness were previously referred to as "culture-bound syndromes;" this term is now recognized as "cultural idioms of distress"[6] or "cultural concepts of distress" to avoid the Euro- American centric viewpoint that illness occurring in other cultures are exotic.[8]

Cultural idiom of distress represent a constellation of symptoms that are recognized in that culture as a disease entity. For example, *ataque de nervios* is a Latino-Caribbean cultural idiom of distress that usually occurs in response to a specific stressor and is characterized by disassociation or trancelike states, crying, uncontrollable spasms, trembling, or shouting.[9] As another example, neurasthenia, (a disorder characterized primarily by extreme fatigue after mental effort and bodily weakness of persistent duration) has been primarily identified as occurring throughout Asia but can also be found in other cultural groups.[10-11] The International Classification of Diseases and Related Disorders defines neurasthenia as a form of depression, however, it is a more socially acceptable illness label in Asia than depression, which might be considered very stigmatizing.[10] Although many Americans would not consider anorexia nervosa or bulimia to be a cultural idiom of distress, it might fit this terminology[12] because major risk factors for these illnesses are social pressures to be thin and media messages equating beauty and thinness, which are both more prevalent in Westernized, developed countries.[13]

Taboos

In many cultures, certain illnesses or behaviors that may be characteristic of illness are highly stigmatized and are often not revealed to healthcare providers. A patient may deny the existence of socially disapproved symptoms and/or decide not to seek treatment. This is particularly true for mental illnesses (e.g., schizophrenia and depression), suicidal thoughts, behavioral disorders in children (e.g., attention-deficit/hyperactivity disorder and autism spectrum disorders), sexually transmitted infections (e.g., herpes or syphilis), and potentially fatal contagious illnesses (e.g., Ebola virus, COVID-19, and AIDS).[14] In some countries (e.g., Malaysia, Singapore, Ghana, Bangladesh, Saudi Arabia, and Nigeria) the social stigma of suicide is replicated in the legal sanctions against it. When suicide is outlawed or religiously prohibited, there is an additional deterrent for an individual contemplating treatment.[15]

ATTRIBUTES AND CRITERIA

The following attributes are related to the concept of culture—that is, conditions common to all cultures: *Culture is learned* through families and other group members; *culture is changeable* and adaptive to new conditions; and *culture is shared* by all within a group through cultural values, beliefs, and behaviors.

Culture Is Learned

Culture may be transmitted to individuals during childhood and adolescence by the process of socialization or enculturation. However, a culture is not limited to members who share the same country of origin or ethnicity and may not be determined solely in childhood; rather, it may encompass any group whose members share certain roles and values, norms, and attitudes—sometimes referred to as subcultures. Subcultures can include racial and ethnic minorities; indigenous or aboriginal heritage; professions, such as nursing; sexual or gender identities, such as lesbian, gay, bisexual, transgender, or queer; particular religious or spiritual groups; age groups, such as teenagers or older adults; and disabilities. Culture is determined by self-identification, and most people identify with a mix of cultures and subcultures.

Changing and Adapting

Since the beginning of human history, culture has been constantly changing as people adapt to environmental and technical innovations and in response to globalization and influences of diverse cultural groups. Population migration occurs as a result of regional overpopulation, changes in economic circumstances, the occurrence of catastrophic events (e.g., earthquakes, floods, and famines), war and political conflict, and the existence of religious or ethnic conflicts. These migration processes result in ongoing encounters between individuals of different cultures, with subsequent changes and acculturation in both groups.[16] Although some people would argue that that this increased intercultural contact diminishes cultural differences, reassertion of local cultures and the transmissibility of subcultures through the internet have, in fact, preserved the unique characteristics of individual cultures.[5]

Shared Beliefs, Values, and Behaviors

Language, rituals, customs (e.g., holiday celebrations), dietary practices, and manner of dress are among the most overt attributes of culture that are readily apparent to non–group members. Some of the less visible attributes of culture, such as values, relationship to authority, social interactions, gender roles, and orientation toward the present or future, are probably the attributes of culture that are most relevant to health care and communication. These kinds of cultural attributes were examined in several landmark studies by Hofstede[17,18] that yielded five dimensions of these attributes. Four of the five dimensions, along with another attribute, spirituality, have particular significance for health care and are presented in the following sections.

Individualism Versus Collectivism

This attribute corresponds to the structure of social relationships and whether feelings of closeness and loyalty belong to immediate families or to the extended family or clan. The differences in these interpersonal interactions can be thought of as individualist, or independent, versus collectivist, or interdependent, and are reflected in the concept of self. Western Europe and the United States are characteristic of individualist societies. Through childrearing practices and a "family model of independence," individualist cultures produce a separated or independent sense of self.[19, p.20] Collectivist cultures foster development of an interdependent self-concept. People who have an interdependent sense of self consider their social worth in relation to others. The value of collectivism or interdependence in self-concept is most clearly exemplified by Asian cultures, but it also applies to African, Latin American, some southern European cultures, and some minority cultures within the United States.[20,21] Cultural differences in social practices are apparent in the differences in colloquialisms heard in the United States and Japan. For example, in the United States, "the squeaky wheel gets the grease," or "a closed mouth won't get fed," whereas in Japan, "the nail that stands out gets pounded down."[21, p.224]

Power Distance

Power distance is the acceptance of an unequal distribution of power as legitimate or fair versus illegitimate from the point of view of the less powerful. Power distance has implications for person-centered health care and patient/nurse communication. A key attribute of person-centered health care is the patient's involvement in their own care and shared decision making.[22] This may be the optimal model for people from cultures that have low power distance. In cultures that value a more equal distribution of power, people have the expectation that their opinions will be heard and equally valued. In contrast, in cultures in which a greater power distance is observed, people are unlikely to overtly challenge or disagree with people in positions of authority because such power is the result of longstanding formal and hierarchical arrangements. Patients from cultures that value greater power distance may be less comfortable expressing their opinions and may prefer to have more directive communications. There may be an *assumed* acceptance and preference for power distance among people within a defined cultural group, this assumption may not align with actual preferences. For example, a study of patient–provider communication in respect to HIV adherence in Mali revealed that patients were equally divided between preferences for collaborative, egalitarian styles of communication and provider-dominant or authoritarian styles of communication.[23]

Masculinity Versus Femininity

Masculinity versus femininity describes how gender roles are conceived and how male and female roles differ. Some societies place greater value on masculine attributes (as defined by Western culture), such as achievement, material success, and recognition, than more feminine attributes, such as harmonious relationships, modesty, and taking care of others. In some cultures, only men can enact masculine roles, whereas in other cultures, gender roles are more fluid. In cultures with more fixed gender roles, women are usually given the role of caretaker for aging relatives and may experience caregiver strain. Cultures that give higher status to men than women and believe in male sexual entitlement have a greater incidence of violence against women and femicide.[24]

Long-Term Versus Short-Term Orientation

Long-term versus short-term orientation is the degree to which a culture is oriented to the future and long-term rewards versus the degree to which a culture is oriented to the past or present.[25] Long-term-oriented cultures favor saving for the future, persevering, and adapting to changing circumstances. Short-term-oriented cultures are oriented to the present or past and emphasize quick results; they favor respect for tradition and fulfillment of social obligations, although status is not a major issue in relationships, and leisure time is important.

In a healthcare context, a long-term orientation would be evidenced by the patient who comes in for preventive care visits, seeks all recommended screening tests and immunizations, and actively takes measures to protect his or her health. A short-term orientation might be evidenced by the individual who seeks treatment for healthcare problems only when the symptoms of an illness become unbearable.

Spirituality

Spirituality is an attribute of culture because spiritual beliefs are a component of and embedded within shared beliefs and values of cultural groups. The definition of spirituality is often debated. Spirituality refers to the sacred or transcendent and can be defined as the quest for meaning and answers to profound questions about life.[26] It can be related to the constructs of peacefulness, harmony, meaning, purpose, and satisfaction in life.[27] Spirituality may or may not entail belonging to an organized religion. When large numbers of individuals share specific spiritual believes and/or practices, this can be identified as a religious group with its own cultural norms. Religion provides a sense of meaning and coherence to help cope with illness and other life adversities.[28]

Cultures differ in religiosity, the extent to which religion permeates one's day-to-day existence, and to what degree religious practices can be separated from nonreligious practices.

THEORETICAL LINKS

A number of theories are associated with culture and health care. Two that are most appropriate for the context of this concept presentation include Leininger's Theory of Culture Care Diversity and Universality and the Interprofessional Theory of Social Suffering. Leininger's theory informs us of the relationship between culture and health care. The interprofessional theory of social suffering speaks to variations in the concepts of health and illness.

Leininger's Theory of Culture Care Diversity and Universality

Leininger emphasized the importance of understanding human behavior in the context of culture, using an "emic" and "etic," approach.[29] The term *emic* refers to understanding culture from within (i.e., the insider's viewpoint), whereas *etic* refers to the application of constructs external to a culture to discover universal characteristics common to all cultures. The assumption of universality can also imply an imposition of an outsider's values, rules, and understanding to another culture or subculture. The concepts of emic and etic are essential aspects of Leininger's theory of culture care diversity and universality.[29]

The central tenet of this theory is that both *emic* and *etic* approaches could lead to more responsive approaches to caring, the most important focus of nursing. To provide meaningful and holistic care, social structure factors, such as religion, economics, education, technology, ethnic background, and history, must be taken into account because these factors have major influences on health, well-being, and illness. This comprehensive approach to nursing formed the basis of Leininger's development of transcultural nursing, the "formal area of humanistic and scientific knowledge and practices focused on holistic culture care … to assist individuals or groups to maintain or regain their health (or well-being)."[30, p.84]

Interprofessional Theory of Social Suffering

The interprofessional theory of social suffering states that all illnesses are a form of social suffering, mediated by cultural and political institutions. Memories of collective trauma and suffering exist within a group or culture and are transmitted through shared experiences and learning.[31] Technological advances can treat an individual's disease, but they do not address the root causes or social determinants of illness, including poverty and the global economy. Tuberculosis, depression, sexually transmitted infections, substance abuse, domestic violence, posttraumatic stress disorders, and AIDS are not individual problems but, rather, a reflection of social structure, health care, and political inequities. Cultural representations of suffering and the responses to it comprise the diversity of human responses to illness and pain. In some cultures, silent endurance is valued, whereas other cultures rail against unjust gods.[31, pp. ix–xiv] Some cultures place a high priority on the well-being and health of their members, whereas other societies are characterized by greater inequities in the health status of their populations.

CORE COMPETENCIES

Culture

1. Conduct a cultural assessment, and apply nursing knowledge to gain a holistic perspective of the person, family, community, and population.
2. Incorporate the patient's unique cultural beliefs and values in communications.
3. Incorporate the patient's unique cultural beliefs, values, experiences, and perspectives in designing and implementing plans of care.
4. Respect the healthcare decisions made by individuals and families, even if these differ from your own values.
5. Demonstrate an awareness of your biases and how they may affect mutual respect and communication with team members.

CONTEXT TO NURSING AND HEALTH CARE

Many nursing students have asked, "Why is there such an emphasis on culture in health care? That's all we keep hearing about." Culture is an essential aspect of health care because of the increasing diversity of the United States. In 2021 the US population was estimated at 332 million people.[32] In that year, the non-Hispanic White population of the United States represented 60% of the total population, a drop of seven percentage points since 2008.[33] This is a result of aging of the White population and a postrecession decrease in fertility among White women. Currently, children aged 0 to 9 years are more likely to be from a minority group than White.[34] By 2050 the non-Hispanic White population is expected to decrease to 50%, assuming the rate of immigration is constant.[35] Half of the population will be composed of people who identify themselves as belonging to a racial or ethnic minority population, including Black; Asian and Pacific Islander; American Indian, Eskimo, and Aleut; and Hispanic.[35]

In addition to racial and cultural diversity, there is significant diversity in spiritual beliefs and religious practices. In a 2020 census of American religions, 70% of Americans identify as Christian, 5% identify with non-Christian religions, and nearly 25% are religiously unaffiliated. The proportion of White Christians has been declining in recent decades, fueled by a growth in the religiously unaffiliated. Young Americans are far more religiously diverse than their older counterparts, and 38% of those aged 18 to 29 years are unaffiliated.[36] The majority of people in the United States believe in God (74%), miracles (72%), and heaven (68%), although this has been diminishing over time and with each succeeding generation.[37] Thus, religious beliefs are in a state of flux in the United States.

Disability represents yet another form of diversity which affects cultural identity. In 2019 approximately 27% of the US population, or 67 million people, had a disability.[38] Some persons with disabilities identify themselves as part of a culture based on shared life experiences; this identification has led to music, publications, and media products unique to those cultures and to the disability rights movement addressing discrimination in housing, employment, and health care. An estimated 4% of the US population ages 18 to 44 years identified themselves as lesbian, gay, bisexual, or transgender.[39] Persons who are lesbian, gay, bisexual, or transgender experience societal discrimination, societal stigma, and human rights abuses that have led to higher rates of mental illness in addition to higher rates of HIV and sexually transmitted infections.[40,41]

Cultural Competency in Nursing

Cultural competency is an expected component of nursing education and professional nursing practice. Although no one can be truly competent in another culture, culturally competent care means conveying acceptance of the patient's health beliefs while sharing information, encouraging self-efficacy, and strengthening the patient's coping resources. The scope and standards of nursing practice specifically identify cultural competency as it relates to assessment, outcomes identification, planning, and implementation.[42] Cultural competency is currently more of an imperative as we begin to understand that healthcare providers' unconscious biases contribute to disparities in treatment,[43] even though nurses and physicians continue to deny that their own behavior is a factor in healthcare inequalities.[44]

As a nursing student, you might be thinking, "Yes, but we are taught how to communicate with our patients, and if I treat everyone with respect and understanding, isn't that sufficient?" By treating everyone the same, we are not providing quality care because we are ignoring societal factors that contribute to worse health outcomes among vulnerable populations. It is true that communicating respectfully is an essential aspect of communication and every patient is an individual with unique needs. However, failure to recognize the fact that people identify themselves as members of certain groups who have shared experiences of social injustice and who are currently treated differently in health care will result in an inability to understand some of the most essential human experiences of our patients.

Now, you may be saying to yourself, "Yes, I understand cultural competency is important, but really, there are so many other things that we need to learn as nurses."

Rubin defines expert nursing as the ability to recognize qualitative distinctions between patients.[45] The ability to make qualitative distinctions, or to be able to understand differences in the patient's life experiences, requires empathy. Empathy is a necessary component of "person-centered" care.[46]

Developing Cultural Competency

The Office of Minority Health provides education for nurses in cultural competency through the Think Cultural Health initiative.[47] The process of developing cultural competency consists of four interrelated constructs—cultural desire, cultural humility, cultural knowledge, and cultural skill.[48,49]

Cultural Desire

A pivotal construct is *cultural desire*.[50] Cultural desire refers to an interest and intent to understand people who are different from oneself. Cultural desire is a personal choice; this interest is foundational to cultural competence and provides the means for overcoming one's biases and their effects on care. Cultural desire leads to patient-centered care as the nurse becomes more attuned to differences between individuals. Like any other effort to master new skills and knowledge, motivation, or cultural desire, is a prerequisite.

Cultural Humility

Tervalon and Murray-García (1998) had the conceptualization of cultural humility as a life-long process of self-reflection and examination of one's own beliefs. It considers privilege and ways to develop consciousness to redress power differences. It is an active process of developing self-awareness to critically analyze one's own beliefs and assumptions.[51] *Self-awareness* involves identifying and understanding one's own cultural identity. You might think about some aspects of your own cultural and religious identity. Did you grow up with people of the same ethnic background as yourself? Did you gather with extended family and engage in traditional activities? Do members of your family make frequent visits to their countries of origin or old neighborhoods? Do you participate in ethnic cultural events? Do you speak another language? Do you have pride in your cultural background? Are you part of a religious or spiritual community? Is this a support to you and how? What importance does your faith or belief have in your life? Do you have spiritual beliefs that help you cope with stress?

Perhaps you are saying to yourself, "But I grew up in an area where everyone is the same as I am, we don't have traditions from the countries where my great grandparents came from, and we just eat normal American food and celebrate the same holidays as everyone else. We are Protestants, but I'm not very religious. I don't have any cultural identification." If you feel that way, ask yourself, "What about the place I grew up? Is it like every other place in the United States? What about the meals I prepare? Does everyone in America celebrate the same holidays? Are all Americans the same? What are my own values and beliefs?"

Perhaps you are saying to yourself, "But I grew up in an area where everyone is from a different culture and I'm very comfortable interacting with other cultures." If you feel that way, ask yourself, "How would I feel living next door to a family with two parents of the same sex or a halfway house for people with chronic severe mental illness? How comfortable do I feel interacting with homeless people? How would I feel if my son or daughter married someone from a religion that I know nothing about? What are my own biases?"

Biases not only are negative stereotypes but also can be any tendency to act, think, or feel in a certain way toward other people. For example, you may believe that people of Vietnamese descent are hardworking, they want their children to do well in school, they expect that their children show respect to their parents, and they stick together. Many nurses believe, "Biases don't apply to me, because I know that even if I personally don't like someone or something they've done, I will treat everyone in a professional manner and will treat everyone the same." Nurses grow up with the values and beliefs of their cultures and the societies around them. Perhaps you believe that abortion is wrong, that it is immoral to have same-sex relationships, that people with depression could really snap out of it if they wanted to, or that people with substance abuse do not have a mental illness—they make choices. Perhaps you feel angry that some people receive health benefits that are "free" and are paid for by your tax dollars. After all, you work hard to earn money, "Why can't they?" "Why do all of those refugees who have moved into my community get Medicaid and can get medications that I can barely afford?" Is it possible to separate all of these feelings from our practice? Many studies indicate that those feelings carry over into the care we provide.

When one's own values and beliefs are directed against a particular group of people, they may still reflect the biases of the dominant cultural group. For example, nurses from independent cultures will develop nursing objectives based on the cultural value of autonomy—developing one's own potential and maintaining one's independence—and equate "more" of such traits with better health. A patient from a more interdependent, collectivist culture might not share such values. For this patient, it might be expected that he or she is dependent on other family members in times of ill health. Moreover, the family's needs and desires might be valued more highly than obtaining one's own personal goals.

Knowledge

Knowledge as a domain of cultural competency does not imply learning facts about every culture but, rather, exposing oneself to other cultures and being motivated to learn. Knowledge can be acquired by reading journals that represent different groups; visiting neighborhoods of other ethnicities and sampling different foods; attending different religious services; learning a foreign language; attending community or professional nursing meetings representing diverse coalitions; speaking with someone from another culture; walking into *botánica*, ethnic grocery stores, or herb shops; attending a service at a mosque or synagogue; speaking with a hospital translator; going to a gay pride march or Puerto Rican day parade; or reading a novel about someone growing up in another culture.

Skills and Competencies

Skills are acquired over time by careful attention to the nurse-patient relationship. One element of cultural skill is communication. Collaborative decision making and patient engagement are key aspects of health outcomes, but culturally and linguistically diverse populations require specific strategies to overcome the barriers of language, distrust, low health literacy, and stigma. There are many resources available to learn basic medical terminology on the web, including Internet and smartphone applications that serve as translators. There are also assessment questions designed to understand the sociocultural contexts of people's healthcare needs. The RESPECT model of cultural assessment, based on a series of eight questions developed by Kleinman,[52] provides a blueprint to develop skills needed to become culturally competent (Box 4.1).[53] RESPECT is an acronym for Respect, Explanatory model, Sociocultural context, Power, Empathy, Concerns and fears, and Therapeutic alliance/trust. *Respect* and *empathy* are attitudes that demonstrate to the patient that his or her concerns are valued and he or she is understood. The nurse can further assess for the patient's *explanatory model*, which is his or her understanding of what is the cause of his or her illness, and their *sociocultural context,* which is the factors in a person's life that may contribute to the current state of health and expectations for treatment, such as poverty, stress, and social support. *Power* refers to the importance of acknowledging that the patient is in a vulnerable position and that there is a difference between patients and healthcare providers in terms of access to resources, knowledge level, and control over outcomes. The loss of power and control that a patient faces can contribute to *concerns and fears* about treatment, illness outcomes, and the future. Bearing in mind the meaning of these concepts in the nursing relationship enhances communication and assessment skills between patient and nurse and creates a *therapeutic alliance/trust.*

BOX 4.1 Eight Questions Associated With the RESPECT Model

1. What do you call the problem?
2. What do you think has caused the problem?
3. Why do you think it started when it did?
4. What do you think the sickness does? How does it work?
5. How severe is the sickness? Will it have a long or short course?
6. What kind of treatment do you think you should receive?
7. What are the chief problems the sickness has caused?
8. What do you fear most about the sickness?

From Kleinman, A. (1980). Patients and healers in the context of culture. Berkeley, CA: University of California Press.

Conducting a Cultural and Spiritual Assessment

Assessment has long been recognized as the foundation for competent, patient-centered nursing care. It should be no surprise that cultural assessment is an expected component of nursing care. A cultural assessment helps nurses gain an understanding of the meaning of the illness to the patient, expectations the patient has regarding treatment and care, and perception the patient has about the process. The patient history includes many questions that link to a patient's cultural perspectives and preference. It is most important to apply elements previously described to the history and assessment so these critical data are recognized and understood. There are formal assessments of spiritual concerns as they pertain to health care, including Faith and belief, Importance and influence, Community, and Address in care (FICA)[54] and SPIRITual History.[55] Data gained from an interview as it relates to cultural assessment are included in Box 4.2. In addition to data collected as part of an interview, the nurse should observe the patient's behavior (e.g., personal space and eye contact), clothing, and presence of articles as cues for additional or clarifying questions.

Supporting Spirituality

Cultures differ in religiosity, the extent to which religion permeates one's day-to-day existence, and to what degree religious practices can be separated from nonreligious practices. Spirituality and religion can serve as a coping mechanism during times of illness, but it can also be a source of distress if illnesses are believed to be a form of punishment from God for misdeeds or moral failings.[28] In low- and middle-income countries, faith healers or traditional healers are often consulted in response to illnesses believed to be caused by spiritual distress.[28] This is also true of Native American and ethnic minority communities within the United States, who may rely upon faith healers in addition to biomedical treatments.[56]

The American Nurses Association Code of Ethics includes a statement regarding nursing's responsibility to address spiritual concerns.[57] As a reminder, spiritual care often does not involve religion. Spiritual care can be provided through three distinct

approaches: communication, action, and presence. Examples of spiritual care include recognizing and honoring the religious beliefs and practices of patients and families, listening to the patient, and encouraging open conversation about spirituality. Other spiritual care interventions include keeping vigil with a family as a loved one struggles to recover, supporting a newly diagnosed chronically ill patient, speaking soothing words, or even reading a prayer or special religious text. Nurses also may refer a person to chaplain or pastoral care.

BOX 4.2 Data Collected as Part of Cultural Assessment

Origins and Family
- Where born; if in other country, length of time in United States and circumstances
- Decision making within family
- Cultural group(s) identified with; presence of social network
- Important cultural practices

Communication
- Language spoken at home; skill in speaking, reading, and writing in English
- Preferred methods to communicate with patient and/or family member (how to be addressed, to whom questions are directed)
- Ways respect is shown to others
- Eye contact, interpersonal space

Personal Beliefs About Health, Illness
- Meaning and belief about cause of illness
- Perception of control over health
- Practices or rituals used to improve health
- Perception of severity of illness
- Expectations for treatment; use of folk remedies, alternative medicine
- Practices that violate beliefs (taboos)
- Concerns or fears about illness or process of treatment

Daily Practices
- Dietary preferences and practices; forbidden foods
- Beliefs about food that pertain to health and illness
- Spiritual beliefs; religious practices
- Special rituals

INTERRELATED CONCEPTS

Several concepts within this textbook are closely related to the concept of culture and are shown in Fig. 4.2. **Person-Centered Care** is the planning, delivery, and evaluation of health care that puts the individual's specific health needs and desired health outcomes at the forefront.[22] Health care is a partnership between the provider and patients.[58] **Diversity**, **Equity**, and **Inclusion** pertains to creating a culture of inclusion that embraces and welcomes a broad range of characteristics of individuals and the population.

Creating a culture of health equity in nursing requires a number of desired outcomes for the *Future of Nursing 2020-2030*.[59] Among many of the desired outcomes, several are particularly relevant to achieving health equity for diverse cultures so that the nursing workforce reflects the people and communities served throughout the nation; that individuals receive culturally competent, equitable healthcare services; and that healthcare systems enable and support nurses to tailor care to meet the specific medical and social needs of diverse patients to optimize their health.[59] Nursing's basic tenet of social justice and the belief that all people deserve quality health care fundamentally call for the need to address health disparities. **Health Disparities and Health Equity** are differences in health outcomes that adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial, ethnic, or cultural group; religion; socioeconomic status; sex; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristic historically linked to discrimination or exclusion.[59] The Affordable Care Act addressed health disparities in access to care that affects people with limited English proficiency, immigrants, and other marginalized groups by providing information, websites, and translations of insurance documents.[60]

Culture affects **Family Dynamics** in many ways, including the manner in which sick family members receive care, beliefs about sharing information with outsiders about a family member's illness, gender roles, and beliefs about appropriate childrearing practices. For example, the dominant practice in America of letting an infant cry himself or herself to sleep to learn how to

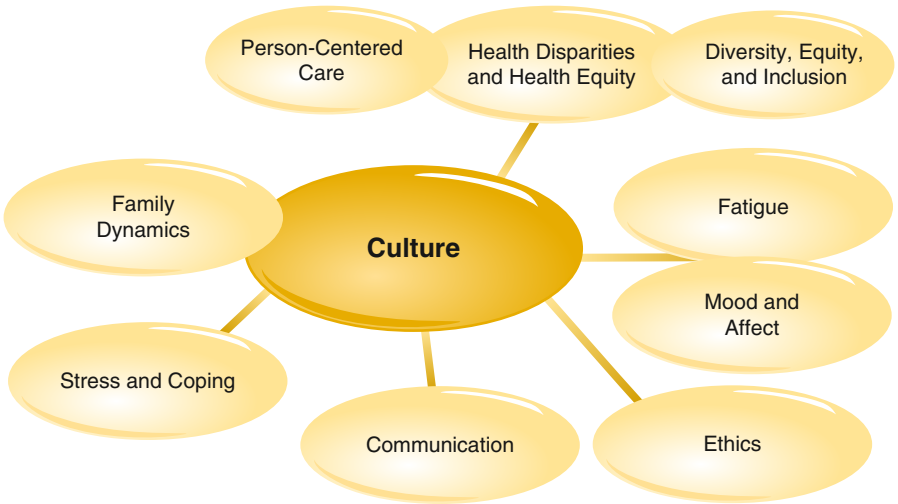

Fig. 4.2 Culture and Interrelated Concepts.

self-soothe may be construed as a form of neglect, particularly for people of cultures that believe in sharing a bed with an infant.

The concept of **Ethics** is interrelated because of the different interpretations and values around appropriate behaviors and actions; in some cultures, practices considered appropriate may be considered unethical in others—thus, ethics may be nested in cultural context. Likewise, the concept of **Communication** is closely related to culture because communication patterns, both verbal and nonverbal, are determined by cultural norms. Degree of eye contact, personal space, and the acceptability of touch all vary by culture. Culture dictates the nature of relationships and the degree of hierarchy and structure in relationships. In some cultures, a high degree of formality and reserve is expected when addressing people of greater social status, whereas in other cultures there is less stratification by age or social standing, and it is acceptable to be direct and open with everyone. Similarly, in some cultures, personal revelations or discussion of family problems are taboo, whereas in other cultures there are no such restrictions on communication.

Stress and Coping involve dealing with life's difficulties and are, to a large extent, culturally determined. Cultural belief systems form the basis of a coping strategy by creating a redefinition of negative circumstances. These belief systems may encompass religious beliefs and religiosity, which may have a beneficial effect on health by fostering positive emotions such as hope, gratitude, and reverence. Religiosity may result in decreased symptoms of distress and may help with coping by decreasing loneliness and fostering cultural identity.

The expression and meaning of some symptoms such as **Fatigue** are influenced by culture. Some cultures seek a biomedical explanation for the medically unexplained symptom of fatigue (e.g., chronic fatigue syndrome and depression) or a lack of fulfillment, whereas other cultures view fatigue as an imbalance of essential energies.[61] Likewise, **Mood and Affect** have a strong interrelationship to culture. Depression is the leading cause of nonfatal disease burden and years of life lived with disability worldwide.[62] Rates of depression are highest among the most vulnerable populations—people living in poverty, immigrants, and refugees.[63,64] Experiences of immigration may also contribute to mood disorders because immigrants experience depression from the stress of adjusting to a new culture, loss of family and traditions, loss of social status, and memories of severe deprivation or political violence in their countries of origin.[65] Individuals from racial and ethnic minority groups are less likely to receive treatment for mood disorders, and when they do receive treatment, it often does not meet the standard of care.[66] Cultural values and beliefs, including the reluctance to share personal problems outside the family or disclose personal problems, a value on self-sufficiency, a lack of recognition of mental health problems, and stigma about mental illness, also create barriers to treatment engagement.

CLINICAL EXEMPLARS

There are multiple exemplars of culture in the context of healthcare delivery. These are best presented using the framework of healthcare practices and beliefs, family roles, and patient-provider communication. The most common exemplars of culture as it relates to healthcare and nursing practice are presented in Box 4.3.

BOX 4.3 Exemplars of Culture

Healthcare Practices/Beliefs

- Symptoms of illness
- Treatment preferences
- Meaning of illness
- Control over health and illness
- Consequences of illness/preventive care
- Dietary practices
- Religious healing practices
- Complimentary alternative or integrative medicine

Family Roles

- Birthrights
- Childrearing practices
- Gender roles
- Family structure
- Decision making
- Death and dying
- Caregiver roles

Patient–Provider Communication

- Language preference
- Nonverbal communication (eye contact, personal space, touch, body posture)
- Power distance
- Taboos
- Revealing personal information
- Expression of emotion

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Featured Exemplars

Language Preference

An estimated 63 million Americans (21%) speak a language other than English in the home, and 8.5% report that they do not speak English well (US Census Bureau).[33] Patients with limited English proficiency face many healthcare barriers in terms of understanding healthcare information, adhering to treatment plans, and following up with care as a result of impaired patient-provider communication. The National CLAS Standards are intended to address these barriers and decrease healthcare disparities by requiring that healthcare organizations "Provide effective, equitable, understandable, and respectful quality care and services that are responsive to diverse cultural health beliefs and practices, preferred languages, health literacy, and other communication needs."[60] Healthcare providers must offer free-of-charge language assistance to individuals who have limited English proficiency or other communications needs; ensure the competency of individuals providing the language assistance, avoiding family members and untrained individuals; and inform them of the availability of language assistance in their preferred language. The Agency for Healthcare Research and Quality has a number of tools and guidelines available to help nurses provide quality care to patients with limited English proficiency.[67]

Decision Making

The values of individualism versus collectivism form cultural differences in the role of the family in determining how people decide to obtain treatments and medical care. For independent cultures, an individual will put himself or herself first in the case

of a life-threatening illness, whereas even in such dire situations, members of collectivist cultures may still consult other family members for the best course of action.

Taboo

A taboo is a prohibited or forbidden action or behavior based on moral judgment and/or religious beliefs in the context of one's culture. Taboos are present in all cultures, and what is considered taboo in one culture may not be considered taboo in another. Healthcare providers must maintain awareness that some procedures and treatment practices considered standard of practice may be considered taboo in some cultures. Examples include physical touch of a female patient for an examination without the consent of the husband and administration of blood products.

Power Distance

People from cultures with greater inequality of power distance may be unwilling to disagree with or question the authority of a healthcare provider, whereas people from cultures in which there is an expectation of equality of relationships may not be hesitant in expressing their wishes and needs for their own health care. Therefore, when a nurse provides education to the patient who is from a culture that values greater power distance, it might appear that the patient is willing to accept all the nurse's suggestions, when further prompting might elicit additional questions or concerns of the patient.

Symptoms of Illness

The symptoms of an illness may vary depending on how a culture understands and perceives the illness. Thus, healthcare providers must consider the possibility that their view of "expected symptoms" associated with certain disorders may be different from that of people from other cultures. For example, in some cultures, it is acceptable to verbalize that one is in pain, whereas in other cultures, the verbalization of pain is seen as a sign of weakness or control. As another example, mental illnesses are described in bodily terms such as backaches, headaches, and fatigue rather than disturbances in mood and affect.

Beliefs About Illness Control

Beliefs about control one has over health and illness are highly variable depending on one's culture and can affect decisions about health promotion practices or care during times of illness. Individuals who hold a belief that they have control over the course of an illness may "appear" to be more engaged in and actively pursue health screening and treatment options. In some cultures, the predominant belief is that what happens is out of one's control, sometimes referred to as fatalism or an external locus of control. In some contexts, an external locus of control can be a culturally protective mechanism that serves to preserve a sense of peace and well-being in situations that are out of one's control, such as a terminal illness.

CASE STUDY

From Tomwang112/iStock/Thinkstock.

Case Presentation

Mr. Wong is a 78-year-old male from mainland China who has been admitted for rehabilitation after surgery for a fractured ankle and lower leg after a fall off a ladder. He has a poor appetite, has experienced weight loss, and has been unable to participate in physical therapy. Thus, he is not meeting his goals for rehabilitation. No evidence exists to suggest an underlying disease process.

Ms. Faye, the nurse assigned to care for Mr. Wong, is interested in learning what might be going on with Mr. Wong to better meet his treatment outcomes. Ms. Faye considers the possibility that he does not have adequate pain relief, which could affect his appetite and cause poor participation in physical therapy. She reviews his history to learn more about him. According to the health history, Mr. Wong is a widower of 3 years; he has a son and daughter who live in distant cities. Mr. Wong emigrated from China at the age of 38 years and speaks only Cantonese. He has lived in an ethic neighborhood with other Chinese Americans and has worked as a short-order cook in a Chinese restaurant since arriving in the United States 40 years ago.

Ms. Faye arranges for Mr. Lee, a Cantonese translator who is also Chinese, to help her ask Mr. Wong a few questions. She first asks Mr. Wong if he is in pain. When he responds in the negative, she follows with another question, asking him if he is depressed or anxious. Again, Mr. Wong responds in the negative, that he is fine. During the interaction, Ms. Faye observes that Mr. Wong does not look at her or Mr. Lee, the translator.

After leaving the room, Ms. Faye expresses her frustration to Mr. Lee, mentioning how difficult it will be to help Mr. Wong when he will not communicate. Mr. Lee responds, "Elderly Chinese people believe that they must be stoic about pain, and there is a stigma about talking about any mental health problems." This explanation had not occurred to Ms. Faye, who then recognizes her approach may have been offensive and that she had failed to consider the underlying cultural differences beyond language.

Ms. Faye asks Mr. Lee to share more about traditional Chinese beliefs. She then asks Mr. Lee to help her ask Mr. Wong additional questions using a cultural assessment form as a guide. After gathering additional information from Mr. Wong and gaining additional insight from Mr. Lee, Ms. Faye incorporates strategies that include changing how his food is prepared and served, changing in approaches to pain management, and involving Mr. Wong's son and daughter in his care.

Case Analysis Questions

1. In what way does this case exemplify the concept of culture in the context of health care?
2. Referring to Fig. 4.2, what interrelated concepts are exemplified in this case? What additional concepts apply that are not included in Fig. 4.2?

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CONCEPT 5

Self-Management

Jewel Scott and Leigh Ann Simmons

Improvements in public health and medical care during the past century have increased people's life expectancy, and now nearly two-thirds of adults living in the United States have one or more chronic diseases, including hypertension, diabetes, and heart disease.[1] As a consequence, a major focus of healthcare services is the ongoing *prevention and treatment* of chronic diseases that have no cure as opposed to primarily treating acute disease.[2] In fact, data show that approximately 90% of healthcare expenditures are for the prevention and treatment of chronic disease.[1] This shift toward chronic disease care has required healthcare systems to revamp their approaches to medical treatment. The paternalistic approach, which views the provider as "expert" and the patient as "passive recipient" of medical advice, is largely ineffective at treating chronic diseases that require daily management by patients and their caregivers. Rather, evidence suggests that patient-centered approaches, which emphasize patient–provider partnerships in which patients are active participants in their care, are most effective for addressing chronic disease.[3]

Self-management is the primary means by which patients and their caregivers play active roles in their health and medical care. Chronic diseases have significant consequences for patients, including persistent symptoms, daily medication use, changes in health behaviors (e.g., exercise and diet), effects on social and work circumstances, and emotional distress. Patients with chronic disease must continuously and over time engage in healthcare practices and make decisions about health behaviors that influence the course and progression of their disease. These self-management practices reduce risk for complications and comorbid illness and improve long-term prognosis and quality of life.[2,3] Thus, self-management is an essential component of chronic disease care, and providers must work with patients to support them in developing their self-management skills.[3] However, self-management is not limited to controlling chronic disease. Health maintenance also requires that individuals engage in daily health-promoting behaviors that support long-term well-being and reduce chronic disease risk. This chapter presents the concept of self-management within nursing practice.

DEFINITION

There are a number of definitions for self-management in the literature. Self-management is often defined as "the day-to-day tasks an individual must undertake to control or reduce the impact of disease on physical health status."[3] Miller and colleagues defined chronic disease self-management as a "process during which patients incorporate multidimensional strategies that meet their self-identified needs to cope with chronic disease within the context of their daily living."[4] For pediatric patients, Lozano et al. defined self-management as a collaboration between patients, families, and care providers designed to support adherence with the health behaviors that are essential to maintaining health and well-being of the child with a chronic condition.[5] Although the definitions of self-management vary slightly, some core expectations and skills are consistent across these definitions.[2–6] First, patients and their caregivers must have sufficient knowledge of the chronic condition and its treatment. Second, they must monitor the condition and respond to information about the current disease state with appropriate cognitive or behavioral responses, all in the context of fluctuating life circumstances (e.g., a patient with diabetes may have to adjust the timing of insulin administration based on home blood glucose monitoring). Third, they must be able to accurately convey important information about their condition and its management to healthcare providers so that providers can impart the information necessary for patients to develop an effective self-management plan. Also, self-management should address not only the behavioral or medical management, but also changes related to shifting roles and related emotions.[2,4] With advancing technology and more Internet-based health tools, sharing information about their condition may occur through electronic uploads of data from devices such as activity trackers (e.g., accelerometers), glucose monitors, or Bluetooth-enabled blood pressure cuffs.[7,8] However, as noted, self-management of key health behaviors (e.g., diet, physical activity, sleep, and stress) is also critical for maintaining good health. Given the definitions in concert with the skills necessary to maintain health and

well-being and manage chronic disease, this definition is proposed for purposes of this concept presentation:

> *Self-management is the ability of individuals and/or their caregivers to engage in the daily tasks required to maintain health and well-being or to respond to the changing physical, psychological, behavioral, and emotional sequelae of a chronic disease based on their knowledge of the condition, its consequences, and the plan of care developed in collaboration with their healthcare team within the context of the daily demands of life.*

SCOPE

From a very broad perspective, the scope of self-management as a concept ranges from a complete absence of self-management to a optimal self-management. The level or degree of self-management varies from person to person and in different situations across the lifespan. Thus, self-management is not a continuous state but rather can be conceptualized as a continuum that can change and is influenced by a number of variables (Fig. 5.1).

Self-management exists within a broad system of collaborative care that includes a partnership among patients, their caregivers, their healthcare providers, and the healthcare system.[3–5,9] Within this system, each member has an essential role in the partnership. Patients and their families become the principal caregivers responsible for day-to-day management and accurate reporting of how their health or chronic condition is progressing. Providers become teachers and advisors who are responsible for helping patients and their caregivers to understand health-promoting behaviors. In the case of chronic disease, providers must also help patients and caregivers to understand the condition, acquire necessary management skills, develop an effective management plan, and build confidence in their ability to respond. The healthcare system becomes the care coordinator that organizes and finances the collection of services available to patients for health enhancement, chronic disease prevention, and management to ensure continuity. Optimal self-management is the by-product of the effective partnership among these members such that health is maximized and the negative consequences of chronic disease—including greater symptomatology, poor disease-related outcomes, reduced quality of life, morbidity, mortality, and excessive healthcare expenditures—are limited.[2–5,9]

The scope of self-management can also be characterized in terms of approaches to enhancing the confidence, knowledge, and skills of patients and their caregivers. Self-management education can be provided one-to-one, in groups, or a combination of both. Information may be relayed in person, by phone or telehealth, or by self-instruction via mailers, manuals, books, websites, mobile applications, and wearable technology (e.g., accelerometers).[7–10] The content of self-management education may include information on guidelines for optimal health-promoting behaviors, the causes and consequences of common chronic diseases, medication management, symptom management, lifestyle behaviors, managing psychosocial effects, social support, and communicating with providers.[3,4,9,10] A variety of entities and individuals may disseminate self-management information and education. These include but are not limited to voluntary healthcare agencies (e.g., the American Heart Association and the American Diabetes Association), state and federal public health systems (e.g., local public health departments and the Centers for Disease Control and Prevention), educational and community-based settings (e.g., schools, worksites, and the YMCA [Young Men's Christian Association]), inpatient institutions (e.g., hospitals and long-term care facilities), ambulatory clinics (e.g., primary and specialty clinics and also ambulatory surgical centers), diverse healthcare providers (e.g., nurses, pharmacists, and physicians), and peers (e.g., others with the same diagnosis who have successfully managed their disease). Many self-management education programs are run separately from clinical patient care but in collaboration with healthcare professionals, although the increased use of technology is allowing for more integration of self-management education and patient monitoring of behaviors within the clinic setting.[7–10] For example, wearable technology has been incorporated into (1) cardiac care to monitor abnormal heart rhythms, (2) Parkinson disease management to monitor gait disturbances, (3) neurologic monitoring for seizures, and (4) poststroke rehabilitation to monitor exercise goals and physical activity.[8] These technologies have improved, in both the types of data collected and ease of patient use, and are becoming increasingly more common in clinical care. In the future, data from wearable technology will be used to tailor self-management interventions to provide personalized health care and improve chronic disease outcomes.[11]

Finally, self-management is essential across the lifespan.[5] During infant, toddler, and school-age years, parents or other caregivers take primary responsibility for self-management skills on behalf of their children. During adolescence, parents and children often share responsibility for these tasks and work to prepare the adolescent to be fully responsible for self-management of their health or condition by early adulthood. As adults, individuals continue to self-manage their health or chronic condition unless they develop significant disability (e.g., age-associated cognitive decline or accident) that prevents

FIG. 5.1 Scope of Concept: Self-Management.

them from handling some or all of the required tasks.[12,13] In this case, partners, children, or other caregivers assist with or assume management as needed. The provider's role in assisting patients with self-management depends on the life stage; the provider can help facilitate patients' and caregivers' transitions between roles and responsibilities in self-management strategies. In particular, clinicians should assess the self-management skills of patients and caregivers and the social contexts in which these skills are being used (e.g., poverty, neighborhood violence, etc.) to determine the types and levels of supports patients may need to successfully manage their health.[4,9,12,14]

ATTRIBUTES AND CRITERIA

Five key attributes characterize self-management: self-efficacy, patient engagement, health education, patient–provider partnership, and disease management.

Self-Efficacy

Self-efficacy is having confidence in one's knowledge and abilities to reach a desired outcome.[10] Patients increase self-efficacy through (1) educational experiences that improve knowledge about their health or their chronic condition and its management, (2) ongoing successful performance of the daily tasks required to enhance health or manage their disease and minimize symptoms, (3) engaging in shared decision making and collaborative problem solving with providers and caregivers about their health or disease, and (4) linkages to individual and community-based support services.

Patient Engagement

Patient engagement is linked to self-efficacy and refers to having the knowledge, skills, ability, and willingness to be an active participant in one's health and health care.[15,16] Patients with greater self-efficacy are more likely to be engaged in the process of their care and to develop the necessary partnerships with their healthcare team that enable them to optimize their health or manage their chronic disease.

Health Education

Health education refers to any combination of learning experiences designed to help patients and their caregivers improve health (or a chronic condition) by enhancing their knowledge, skills, and confidence or influencing their attitudes toward self-management.[17] As a central feature of chronic disease care, patients must frequently be taught about the condition itself and about how to manage it. This self-management education complements traditional patient education and includes core features such as problem-solving skills, decision making, the utilization of resources, forming a strong patient–provider team relationship, taking action, and self-tailoring.

Patient–Provider Relationship

The *patient–provider relationship* serves as the vehicle through which optimal self-management occurs. Patient-provider relationships are most effective when patients take responsibility for their health (or chronic condition) to the degree possible, and the "provider," or members of the healthcare team, work collaboratively with the patient to design a care plan that reflects the patient's unique circumstances. A strong patient–provider relationship is essential to patient-centered care in which patients' needs, concerns, problems, and values remain at the center of care and self-management approaches are responsive to patients' unique needs and preferences, including addressing any systemic or structural barriers that impede patients' capacity to adhere to recommendations.[2,10]

Disease Management

Disease management is a system of coordinated healthcare interventions and communications for patients with chronic conditions that require significant self-management efforts.[18] The primary goal of disease management programs is to improve population health and reduce healthcare costs by mitigating the future complications of chronic conditions through effective self-care.

THEORETICAL LINKS

Two key theories within the field of psychology underpin self-management and its attributes: social cognitive theory and cognitive behavioral theory. A third theory developed by a psychologist, the social-ecological model, has been applied to self-management.

Social Cognitive Theory

Social cognitive theory is based on the idea that individuals' expectations influence their behaviors.[19,20] Thus, individuals with high self-efficacy, or those who believe they can organize and execute a course of action necessary to produce a desired outcome, are more likely to view difficult tasks as things to be mastered versus avoided. Individuals in good health remain confident that they can maintain their health by practicing positive health behaviors. Among individuals with chronic disease, those with greater self-efficacy—or those who believe they can perform well—will be more likely to successfully manage their condition. Self-management education that helps patients increase self-efficacy by improving their knowledge of the disease and the tasks essential to managing the disease and its symptoms frequently results in better health behaviors and outcomes.

Cognitive Behavioral Theory

Cognitive behavioral theory is similar to social cognitive theory in that the theoretical foundation is the notion that thoughts affect behavior. Thus, helping people to change the way they think about (1) their health or chronic condition and (2) themselves in relation to their health or illness is necessary to help them self-manage effectively (Fig. 5.2).[21,22] Several features of cognitive behavioral theory are evident in self-management education and practices. Specifically, cognitive behavioral theory assumes an active, involved patient who is responsible for engaging in specific actions as part of a plan developed with his or her provider that is responsive to the patient's individual needs and preferences.

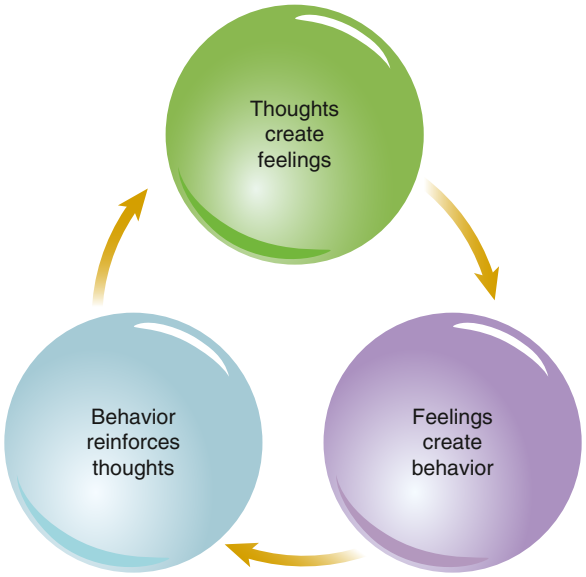

FIG. 5.2 Cognitive Behavioral Theory. (Redrawn from Stangor, C. (2015). Introduction to psychology. (v. 1.0). Washington, DC: Flat World Education.)

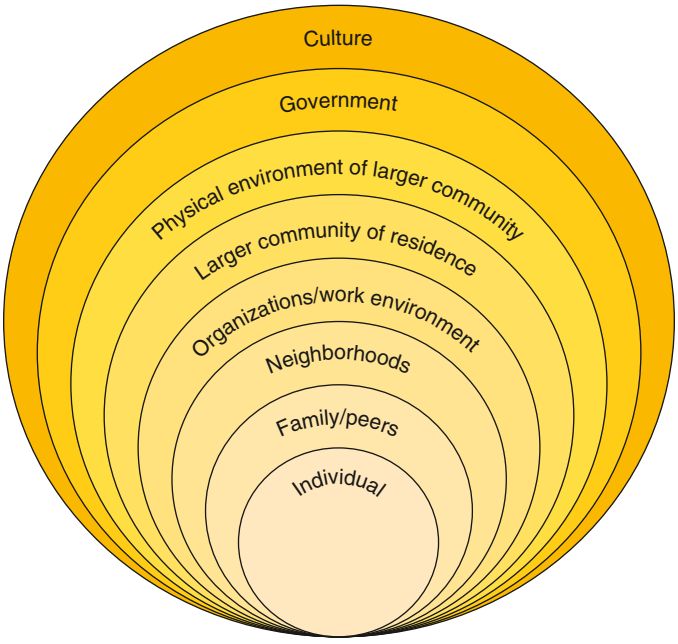

FIG. 5.3 Social-Ecological Model

Social-Ecological Model

The *social-ecological model* is relevant to self-management because it incorporates the influence of the physical and social environment on behavior.[5,23,24] The social-ecological model is often visually represented by concentric circles with the patient at the center (Fig. 5.3). The circles closest to the patient represents the influence of the microsystem and consists of family, household, school or work, and neighborhood. The larger circles, the macrosystem, interacts with the individual to influence self-management through societal norms and policies. An ecological approach to self-management recognizes that, in addition to patient-level factors (e.g., motivation, self-efficacy), individuals also interact with community and system-level factors that may positively or negatively influence their ability to manage their health or chronic condition.[9,14,23,24]

CONTEXT OF NURSING AND HEALTH CARE

Nurses help patients and their caregivers with self-management throughout the lifespan in diverse clinical and community-based settings and across the continuum of care from health enhancement and wellness to chronic disease prevention, management of ongoing disease, and recovery from an acute event. The subsequent sections describe the role of self-management in nursing care for each of these areas.

CORE COMPETENCIES

Self-Management

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to Self-Management.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing challenges and strengths.
- Collaborate with the patient, family, and interprofessional team to establish self-management goals based on the patient's preferences.
- Identify potential variations in self-management needs across the lifespan.
- Educate individuals, families, and communities regarding self-management for health promotion, illness prevention, and illness management.

Health Enhancement and Wellness

Across the lifespan, nurses help patients, and their caregivers engage in positive behaviors that optimize health and promote well-being. A critical component of patient self-management for health enhancement and wellness is that patients must schedule and attend wellness visits and screening appointments. They must also engage in the lifestyle behaviors that promote good health, including eating a healthy diet, engaging in regular exercise, getting sufficient sleep, managing stress, and reducing unintentional injuries through safety measures such as wearing a seat belt or helmet and using age-appropriate car seats for children. Nurses may impart some of this information to patients during one-to-one clinical visits; however, community-based and public health initiatives also serve as a source of information on how individuals can self-manage their daily decisions to maximize health. Community health nurses may provide self-management support for new parents through home visiting programs focused on health promotion and child development. They also lead disease-focused programs such as school nurses providing educational support for parents of children with asthma and diabetes prevention groups for individuals with diabetes risk factors.

Predisease and Disease Prevention

Predisease is a state in which individuals do not meet the full set of criteria for a diagnosis but have one or more clinical markers indicating that they are not completely healthy.[25] Some common predisease states include prediabetes, elevated blood pressure

(that does not yet meet diagnostic criteria for hypertension), and precancerous lesions. These states are most often diagnosed as a result of age-, sex-, and risk-based screening. For many predisease states, there are some important self-management tasks for patients to initiate, such as changing diet, engaging in physical activity, quitting smoking, using sunscreen, or even starting a low-dose medication. Nurses play an important role in helping patients to understand both the predisease state and the ultimate disease, including family, lifestyle, and environmental factors that contribute to the disease, their risk of developing the disease based on their current health status and risks, and the potential benefit of making changes to reduce the risk of developing the full disease. A core component of this education is assessing patients' capacity for making changes. That is, nurses need to understand the social and environmental contexts in which patients are trying to self-manage in order to partner with them to help them decide how to approach the necessary changes. For example, if a patient must exercise but lives in an unsafe neighborhood, the nurse and patient will have to work collaboratively to identify a safe means for exercising, such as walking in place at home while watching television. Mobile health tools are also a means through which patients may address barriers, including using mobile applications that track food intake, provide physical activity prompts and workouts, monitor mood, and teach stress-reducing practices (e.g., mindfulness meditation).[7,8]

New Diagnosis of Disease

When patients receive a new disease diagnosis, frequently they must make significant lifestyle changes. Helping patients to self-manage a new disease requires that nurses provide education regarding both the disease and its management. Education about the causes and consequences of the disease helps patients to understand the importance of self-management in general and the specific self-management tasks in which they will need to engage. Much of the information about chronic disease that nurses provide is conveyed individually or in groups in ambulatory clinical areas and community-based settings. However, broad public health initiatives from voluntary healthcare entities, such as the American Heart Association or the American Diabetes Association, also serve as a source of important information for individuals with chronic disease, and nurses can leverage these sources when they are working with patients and their caregivers. As with predisease states, considering patients with chronic disease holistically and understanding their capacity for making changes is critical to successful management over time.

Acute Event Management

An acute event—such as a stroke, myocardial infarction, asthma exacerbation, or hip fracture—is frequently a life-changing occurrence, especially for individuals who were unaware of or did not understand their risk for the event. Self-management after an event is critical to the patient's full recovery, including achieving the best health possible given his or her disease state and preventing recurrence of the event, development of comorbidities, or even mortality. As with a new diagnosis, recovery from an acute event requires patient self-management of new medications, changes in lifestyle behaviors, and greater healthcare utilization as a result of increased monitoring, specialty care, and ancillary health services (e.g., dietician and exercise physiologist). If the patient was already managing a chronic disease, these changes may not be as significant as they might be for a patient who was unaware of his or her risk for the event. Thus, nursing interventions will involve tailoring self-management education to the patient's preevent state. For example, a patient with diagnosed coronary artery disease who was already taking lipid-lowering drugs and daily low-dose aspirin who has a myocardial infarction will need different self-management education than a patient who did not have diagnosed coronary artery disease prior to their myocardial infarction.

Social and Environmental Factors

A patient's ability to self-manage their health or chronic condition is influenced by their social relationships, home, and community environment.[9,14] One way to integrate social care into self-management education is the practice of these five activities: awareness, adjustment, assistance, alignment, and advocacy.[26] First, nurses need an awareness that social risks such as food insecurity or neighborhood safety can negatively affect self-management. Establishing a process for routinely assessing social risks and assets is an important part of collaborating with patients to meet their self-management needs. Adjustment and assistance are individual-level actions that the nurse can take. These include adjusting patient education to the literacy level or preferred language of the patient and connecting the patient with community programs, such as medication assistance programs if medication costs are a barrier to medication adherence. Alignment and advocacy are actions at the community and organizational levels that nurses can support and lead. As part of healthcare organizations, nurses can identify existing community supports, facilitate synergies between communities and healthcare organizations, and advocate for policies that promote resources to address health and social needs. Taken together, awareness, adjustment, assistance, alignment, and advocacy will support the nurse in tailoring self-management activities to the specific needs of the individuals and communities.

INTERRELATED CONCEPTS

A number of concepts within nursing care are interrelated with self-management; these are presented in Fig. 5.4. **Patient Education** is a central feature of self-management. Healthcare professionals must provide patients with education that helps them to understand the causes and consequences of their disease and the strategies for managing their condition long term. Self-management education does not replace general health education but rather complements it with a specific focus on building capacity for ongoing self-care practices that promote optimal health for the individual. **Health Promotion** is related to self-management in that it focuses on helping

FIG. 5.4 Self-Management and Related Concepts.

individuals and communities to take control of their health and ultimately improve it.[17] Whereas some health-promotion efforts focus primarily on individuals and how they might manage their behaviors and choices, many approaches move beyond the individual to address a broad range of community, social, and environmental determinants of health that also require management at various levels.[17] **Collaboration** between patients and providers has also been identified earlier in this chapter as a central feature of self-management. Optimal self-management of chronic conditions depends on patients and providers working together to identify priorities, goals, and specific plans of action to achieve those goals.[3,10,12] The concept **Person-Centered Care** incorporates an individuals' values and preferences in all aspects of their health care, including self-management.[27] Providing person-centered care requires collaboration between the patient, people who are important to them, nurses, and healthcare professionals, who support patients in meeting their self-management goals. **Care Coordination** is also essential for patients with chronic disease to effectively self-manage. Frequently patients need additional information about their disease from specialists and/or must acquire more knowledge and skills regarding diet, physical activity, smoking cessation, medication adherence, and other lifestyle behaviors that affect their condition. Thus, the care of chronic disease becomes a team-based approach wherein multiple providers work together to support patients in their ongoing self-management. These providers can range from specialty physicians and nurse practitioners (NPs) to registered nurses and other allied health professionals such as nutritionists, exercise physiologists, and health behavior specialists. Coordination among these providers regarding services and recommendations is essential for patients to effectively self-manage their conditions without becoming overwhelmed by the amount of information they receive. Finally, populations experiencing **Health Disparities and Health Equity** have higher rates of chronic disease and may face challenges in meeting key social needs (e.g., access to food, housing, transportation), which affects their self-management practices leading to worse health outcomes.[28] Self-management education for these patients must consider how a lack of resources or education may be exacerbating poor self-management.

CLINICAL EXEMPLARS

Self-management cuts across all areas of health care and populations served—from wellness and health promotion to chronic disease management. For this reason, there are far more exemplars of self-management than could possibly be presented in this text. Box 5.1 presents a list of the most common exemplars by age group and context that represent the concept. Next, six of these exemplars are featured, with short descriptions.

Featured Exemplars

Prenatal Care

Regular prenatal care helps to inform women about the steps they can take to ensure they have a healthy pregnancy. These include consuming a healthy diet, taking prenatal vitamins with at least the minimum daily folic acid requirements, getting regular exercise, avoiding exposure to harmful environmental substances, avoiding alcohol and drugs, and managing preexisting conditions. Ongoing monitoring of the mother's weight, blood pressure, and urine along with results from evidence-based screenings serve as the basis for recommended changes in self-management practices to reduce risk for maternal and infant complications.[29] Women who develop complications of pregnancy—such as gestational diabetes, gestational hypertension, or preeclampsia—will need education about their condition and how to manage it through changes in diet, physical activity levels, stress, and medication.

Pediatric Asthma

Asthma is one of the most common and costly chronic disorders in children, affecting nearly 10% of all youth younger than age 18 years and accounting for nearly $80 billion annually in

BOX 5.1 EXEMPLARS OF SELF-MANAGEMENT

Health Enhancement/Wellness
- Pediatric well-child visit
- Prenatal care
- Adult/older adult annual wellness visit

Predisease/Disease Prevention

Pediatric
- Prediabetes
- Overweight
- Elevated blood pressure

Prenatal
- Prehypertension
- Preeclampsia
- Excess gestational weight gain early in pregnancy

Adults
- Elevated blood pressure
- Prediabetes
- Overweight
- Precancerous lesions
- Osteopenia
- Vision impairment
- HIV infection

Disease/New Diagnosis

Pediatric
- Anemia
- Asthma
- Overweight/obesity
- Diabetes
- Malnutrition
- Developmental disabilities
- Sickle cell anemia
- Behavioral/mental health

Prenatal/Maternal
- Gestational hypertension
- Preeclampsia
- Gestational diabetes
- Depression

Adult/Older Adult
- Coronary artery disease
- Type 2 diabetes
- Obesity
- Coronary obstructive pulmonary disease
- Hypertension
- Osteoporosis
- Arthritis
- Glaucoma
- Dementia
- Depression
- AIDS

Acute Medical Events

Pediatric
- Orthopedic (sprains, ligament tears, broken bones)
- Accidental ingestion (e.g., poison substance, medication)
- Burns
- Sports-related traumatic brain injuries (concussions)

Prenatal Care
- Premature labor
- Premature rupture of the membranes

Adult/Older Adult
- Congestive heart failure
- Myocardial infarction
- Stroke
- Falls (hip fracture)
- Pneumonia
- Acute renal failure
- Infection/sepsis
- Sickle cell crisis
- Suicide attempt

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

healthcare expenditures.[30,31] It is also one of the leading causes of school absenteeism.[24] If not managed properly, asthma can be life-threatening. Proper self-management includes helping patients and their parents or caregivers adhere to daily medications, understand triggers, know how to self-monitor and assess symptoms for rescue treatment, and make changes to their environments (e.g., reducing or eliminating secondhand smoke exposure, placing dust mite covers on bedding, etc.).

Sickle Cell Disease

Sickle cell disease (SCD), a genetic blood and blood-vessel disease, occurs in approximately 100,000 people in the United States and millions more worldwide.[32] In the United States, SCD is most often identified as part of routine newborn screening. An SCD exacerbation is referred to as a sickle cell crisis with the most prominent feature being severe pain. Many individuals with the most severe forms of SCD have a life expectancy reduced by 20 to 30 years because of increased risk of cerebrovascular accidents (i.e., stroke), pulmonary complications, and cardiovascular complications. However, with improved care access and self-management, most children with SCD are surviving into adulthood. Self-management for SCD includes staying well hydrated, eating a balanced diet, remaining physically active while avoiding overactivity, and monitoring pain and emotional well-being.[33,34]

Type 2 Diabetes

Type 2 diabetes is one of the most prevalent preventable chronic diseases among adults in the United States and worldwide. In addition, the number of children being diagnosed with type 2 diabetes is increasing with the growing prevalence of pediatric overweight and obesity.[35] Self-management of weight through regular physical activity and a healthy diet is the most

cost-effective means of preventing or delaying the onset of type 2 diabetes. Once diagnosed, self-management becomes equally critical to the prevention of complications, morbidities, and mortality. Self-management tasks include regular visits to a provider, medication adherence, and health-promoting lifestyle behaviors (e.g., physical activity and a balanced diet).

HIV/AIDS

More than 1.2 million people ages 13 years or older in the United States are infected with HIV, and approximately 12.5% of them do not know that they are infected.[36,37] Every year, nearly 40,000 people are newly diagnosed with HIV, and another 18,000 are diagnosed with AIDS.[36,37] Risk for HIV/AIDS is highest among men who have sex with men, injection drug users, and Black/African American or Latino populations. Regular healthcare visits to monitor viral load, opportunistic infections, cardiovascular health, medication adherence, and safe sex practices are among the critical self-management practices individuals with HIV/AIDS must undertake to minimize their risk for morbidity and mortality.[36,37] For individuals at-risk of HIV, self-management to prevent HIV infection may be discussed as part of primary care, obstetric, or family planning services and can include taking daily preexposure prophylaxis (i.e., PrEP).[38]

Heart Failure

Heart failure is one of the most common complications of coronary artery disease. Approximately 5 million US adults live with heart failure; it is the most common diagnosis for hospital patients 65 years of age or older.[39] Sudden death is common among heart failure patients; more than half of these individuals die within 5 years of diagnosis, and it contributes to nearly 275,000 deaths annually. As with most chronic conditions, patients with heart failure benefit from education about their disease and self-managing diet, physical activity, weight, and medication adherence.

Depression

Depression is a common mental health disorder that affects approximately 8.4% of adults and 17% of adolescents aged 12 to 17 years in the United States. Individuals most affected by depression are adults aged 18 to 25 years, women, multiracial individuals (e.g., reporting 2 or more races), individuals without a high school education, and those without health insurance. Treatment for depression includes the use of medication and psychotherapy. In addition, patients must learn to manage their moods, including suicidal thoughts; to recognize triggers and relapses; and to set goals for the management of their disease.[40]

CASE STUDY

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Case Presentation

Margaret is a 5-year-old with a medical history of an acute asthma attack at age 3 years requiring 5 days of hospitalization, 2 of which were in the pediatric intensive care unit. Her parents made an appointment with an NP to get advice on how to better manage Margaret's asthma. In the previous year, they had taken Margaret to the emergency department three times and to urgent care twice. She has been on oral steroids (prednisolone) four times in the previous 12 months, and she uses her rescue inhaler (albuterol) at least twice weekly when she is well. In the first 4 months of the school year, Margaret missed 12 days of kindergarten because of asthma.

The NP evaluates Margaret. Her vital signs and body mass index are within the normal rage. Her parents report that Margaret receives her maintenance medications most days, missing on average 1 or 2 days per week. The NP asks about the family's living situation and learns that Margaret lives with her biological parents and a 7-year-old Labrador retriever, which is an indoor dog. Her paternal grandmother, a smoker, also lives with the family during the winter months. The family's house is 76 years old with carpeted living and sleeping areas and a basement. The parents do not have Margaret's bedding encased with dust mite protectors. The parents deny any mold, mice, or cockroaches in the home. The parents report that Margaret occasionally wheezes during activity, but she does not pretreat with her rescue inhaler.

The NP discusses with Margaret's parents the importance of daily medication adherence as the first line of defense. When she investigates further, she learns that the nebulizer administration sometimes gets in the way of her parents adhering to their daily schedule. The NP discusses with them increasing the daily dose and changing the administration route to the metered dose inhaler with spacer, which they already use for the rescue medications. The parents agree this would make daily adherence easier. The NP also educates the family on asthma triggers and the role of smoking. She asks the parents to discuss with the grandmother smoking outdoors when she is visiting. The parents agree that they will discuss with each other how to approach the conversation. The NP educates the parents about bedding encasements for mattresses and pillows and provides a flyer listing online stores that sell them. The parents agree to purchase these encasements. Because the parents report that Margaret coughs with physical activity, the NP recommends pretreating Margaret with two puffs of the rescue inhaler before exercise, and the parents agree. Finally, the NP discusses the importance of keeping track of medication administration and symptoms using a mobile application or paper-based recording tool in order to determine triggers and patterns in symptoms. The mother downloads a tool in the office to begin tracking. Based on the conversation, the parents and NP together update the asthma action plan and agree on a follow-up plan. The NP asks the family to follow up in 3 months or sooner if Margaret needs to go to the emergency department or urgent care.

Case Analysis Questions

1. What information exists suggesting that Margaret's condition is not being managed optimally?
2. What specific measures are described that would improve the management of Margaret's asthma?
3. What could the NP and the healthcare system where she works do to integrate social care into the care that Margaret and her family received?

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SECTION II

Health and Illness Concepts

HOMEOSTASIS AND REGULATION

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7 *Acid–Base Balance*
8 *Thermoregulation*
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SEXUALITY AND REPRODUCTION

19 *Reproduction*
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21 *Immunity*
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MOOD, COGNITION, BEHAVIOR

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The provision of health care is geared toward three general goals: to promote health, to prevent disease or injury, and to treat illness or injury when it arises. These do not represent three separate and competing goals; rather, these goals characterize the health and illness continuum and apply to all people across the life span. The concepts presented in Section II are related to these goals within the context of the patients who receive nursing care.

Health and illness concepts are complex and represent a multitude of health-related conditions. These concepts are presented similarly and include concept definition, scope of concept, physiologic processes, variations and context, consequences, risk factors, assessment, clinical management interrelated concepts, clinical exemplars, and a case study. Presented from a life span and health-continuum perspective, these concepts focus on the commonalities of conditions represented as opposed to specific disease conditions. For each, nurses should understand the concept and notice situations that place an individual at risk for less-than-optimal function; furthermore, nurses should know how to recognize alterations when they occur, and they should have a general understanding of interventions both to promote optimal health and to restore health if an alteration occurs. Four themes are used to organize 30 concepts in this section:

- Homeostasis and Regulation
- Sexuality and Reproduction
- Protection and Movement
- Mood, Cognition, Behavior

CONCEPT 6

Fluid and Electrolytes

Linda Felver

Fluid in the body circulates in the blood and lymph vessels, surrounds the cells, and provides the environment inside cells in which cellular chemistry occurs. The amount, concentration, and composition of the fluid influence function at all levels from the cell to the whole person. The body continuously adjusts fluid characteristics and location through specific physiological processes that nurses must understand in order to help people maintain or restore their fluid and electrolyte balance and function optimally. This chapter presents a conceptual analysis of fluid and electrolytes that includes the process of maintaining balance and recognition and management of imbalances when they occur.

DEFINITION

The concept Fluid and Electrolytes refers to *the process of regulating the extracellular fluid volume, body fluid osmolality, and plasma concentrations of electrolytes.* Fluid is water plus the substances dissolved and suspended in it. Important characteristics of fluid are its volume (amount) and its degree of concentration (osmolality), which are discussed in this chapter. Another important characteristic of body fluid is its pH, which is discussed in Concept 7, Acid–Base Balance. Electrolytes are substances that are charged particles (ions) when they are placed in water. Examples of electrolytes are sodium ions (Na^+), potassium ions (K^+), calcium ions (Ca^{2+}), and magnesium ions (Mg^{2+}). In healthcare settings, people often omit the word "ion" when they discuss electrolytes, referring to K^+ as "potassium," for example. All body fluids contain electrolytes; body fluids in different locations normally contain different concentrations of electrolytes that are necessary for optimal function.

The maintenance of physiological balance of body fluid and electrolytes is a dynamic interplay between three processes: intake and absorption, distribution, and output. *Intake and absorption* refers to the addition of fluid and electrolytes to the body (intake) and their movement into the blood (absorption). *Distribution* is the process of moving fluid and electrolytes between the various body fluid compartments. These fluid compartments include those inside the cells (holding *intracellular* fluid) and those outside the cells (holding *extracellular* fluid). The extracellular fluid (ECF) compartment consists of fluid between the cells (*interstitial* fluid) and fluid inside blood vessels (*vascular* fluid).[1] *Output* is the removal of fluid and electrolytes from the body through normal and abnormal routes.

Fluid and electrolyte balance is a dynamic interplay because fluid and electrolyte output occurs continuously. Intake of fluid and electrolytes influences output to some degree, but intake easily can become less than or more than output. Fluid and electrolyte distribution can shift rapidly when conditions change. Optimal fluid and electrolyte balance keeps fluid volume, osmolality, and electrolyte concentrations in the various body fluid compartments within their normal physiological ranges.

SCOPE

From the most abstract perspective, the concept of Fluid and Electrolytes is quite simple: One has either an optimal balance or an imbalance. Fluid and electrolyte imbalances can be too little, too much, or misplaced. Conceptually, *fluid balance* has two aspects: extracellular volume and osmolality. *Electrolyte balance* requires separate consideration. Extracellular fluid volume (ECV), body fluid osmolality, and plasma electrolyte concentrations can each be visualized as a continuum, with three categories: optimal balance and two types of imbalances (Fig. 6.1).

NORMAL PHYSIOLOGICAL PROCESS

An understanding of the physiological processes of fluid and electrolyte balance provides the foundation for understanding the consequences of imbalances or disruptions. Three physiological processes create fluid and electrolyte balance: intake and absorption, distribution, and output. Optimal balance occurs when both of these characteristics are present:

- Intake and absorption of fluid and electrolytes match the output of fluid and electrolytes.
- Volume, osmolality, and electrolyte concentrations of fluid in the various body fluid compartments are within their normal ranges.

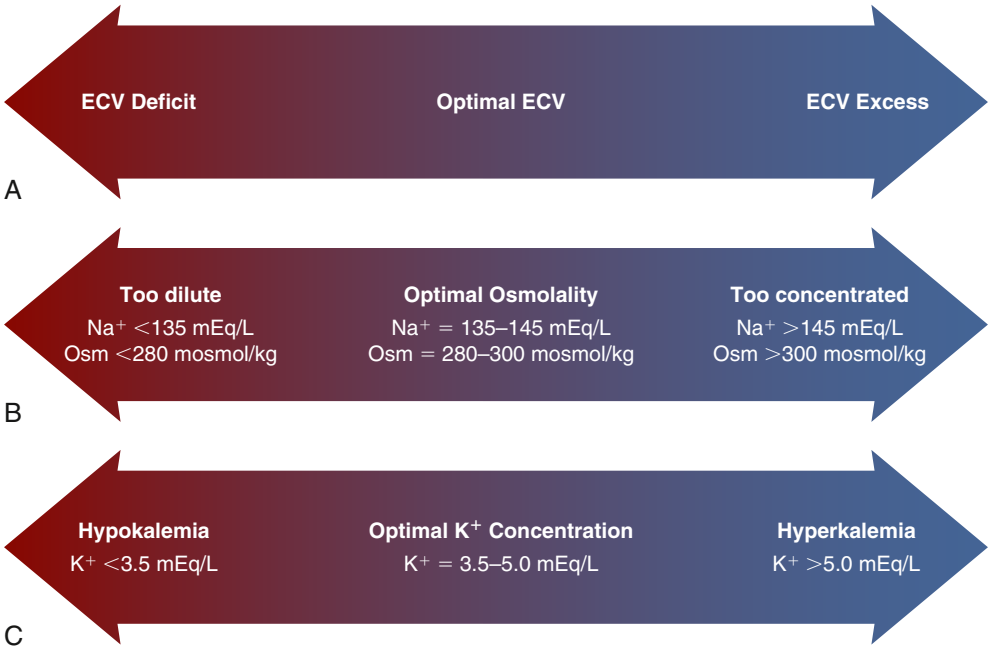


Fig. 6.1 Scope of Concept: Fluid and Electrolyte Balance. (A) Scope of extracellular fluid volume balance. (B) Scope of body fluid osmolality balance. (C) Scope of electrolyte balance. Potassium is used as an example. *ECV,* extracellular fluid volume; *K+*, potassium ions; *Osm*, osmolality; *Na+*, sodium ions.

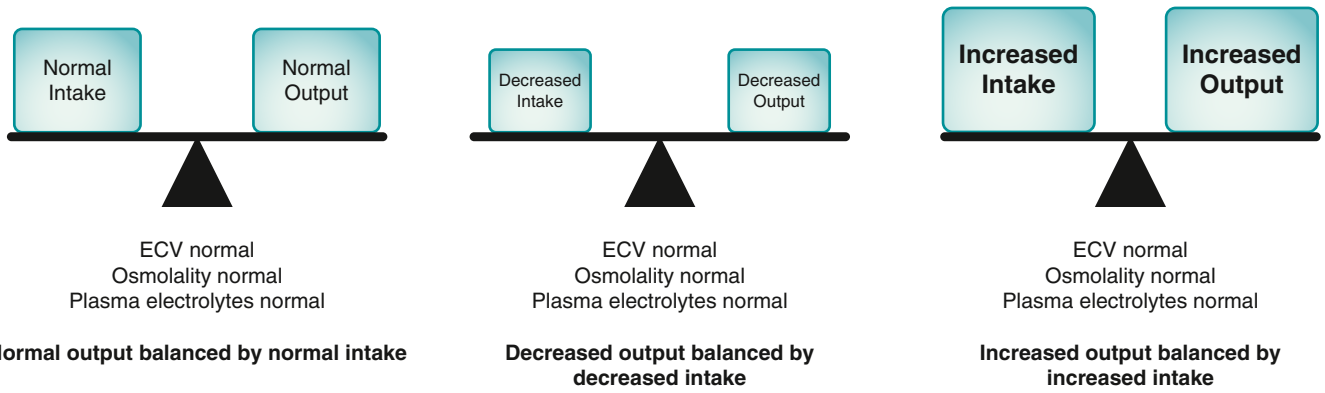


Fig. 6.2 Optimal Balance of Fluid and Electrolytes With Fluid and Electrolyte Output Balanced by Intake. *ECV,* extracellular fluid volume.

To maintain optimal fluid and electrolyte balance, output must be matched by appropriate intake, and the intake must be absorbed (Fig. 6.2).

Intake and Absorption

The most common route of fluid and electrolyte intake is oral. Other routes include intravenous (IV) administration and, less commonly, avenues such as insertion into the rectum, introduction through nasogastric or other tubes into the gastrointestinal (GI) tract, instillation into body cavities, and infusion into subcutaneous tissues (hypodermoclysis)[2] or bone marrow (intraosseous).[3] The amount and type of intake can be manipulated deliberately to maintain fluid and electrolyte balance. Habit, anticipation of need for fluid, and thirst are strong influences on oral fluid intake. The most important stimulus to thirst is increased osmolality of body fluids, although dry oral mucous membranes, angiotensin II, and arterial baroreceptor stimulation during severe hypovolemia also trigger thirst.[4]

Fluid and electrolytes that enter the body by all routes except IV must be absorbed into the bloodstream. IV fluid and electrolytes do not require absorption because they enter the bloodstream directly. Absorption is especially important to consider for oral intake of the electrolytes Ca^{2+} and Mg^{2+}, which have specialized absorption mechanisms in the intestines. Ca^{2+} absorption in the duodenum, its most important absorptive site, is dependent on adequate availability of vitamin D.[1] A healthy intestinal epithelium in the terminal section of the ileum is necessary for Mg^{2+} absorption. If fluid and electrolytes are not absorbed, they remain in the GI tract and leave the body in the feces.

Distribution

After fluid and electrolytes enter the blood, they are distributed to various body compartments. Normal fluid and electrolyte distribution is necessary for optimal function. The process of filtration distributes the ECF between the two major extracellular

compartments: vascular and interstitial. The process of osmosis distributes water between the ECF and cells because of osmotic forces. Numerous factors distribute electrolytes between the ECF and electrolyte pools.[5]

Fluid Distribution Between Vascular and Interstitial Compartments

Fluid distribution between the vascular and interstitial compartments occurs by *filtration,* the net result of simultaneous opposing forces at the capillary level. Two forces tend to move fluid out of capillaries and two other forces tend to move fluid into capillaries.[1] The forces that are stronger at any particular time determine which way the fluid moves. *Hydrostatic pressure* pushes fluid out of its compartment. Capillary blood hydrostatic pressure (a relatively strong force) pushes fluid out of the capillaries; interstitial fluid hydrostatic pressure (a relatively weak force) pushes fluid out of the interstitial compartment back into capillaries. *Colloid osmotic pressure,* caused by large protein particles in the fluid, pulls fluid into its compartment. Thus, capillary blood colloid osmotic pressure (normally a relatively strong force) pulls fluid into the capillaries; interstitial fluid colloid osmotic pressure (normally a very weak force) pulls fluid out of the capillaries and into the interstitial compartment. With normal fluid distribution, the net result of these opposing forces filters some of the ECF from capillaries into the interstitial compartment at the arterial end of capillaries, bringing oxygen and nutrients to cells. At the venous end of capillaries, some interstitial fluid filters back into the capillaries, carrying waste products to be excreted.

Water Distribution Between Extracellular and Intracellular Fluid

The structure of cell membranes allows water to cross the membrane readily, but Na^+ enters with difficulty. This is the reason why cell membranes are called *semipermeable.* The process of *osmosis* is the movement of water across a semipermeable membrane that separates compartments with different concentrations of particles. As noted, the osmolality of a fluid is its degree of concentration. Technically it is the number of particles per kilogram of water.[1] Osmosis occurs almost instantaneously when the osmolality changes on one side of the semipermeable cell membrane. This rapid equilibration keeps ECF and intracellular fluid at the same osmolality.

Electrolyte Distribution

With the exception of Na^+, which has a high ECF concentration that reflects osmolality, electrolytes have low concentrations in the ECF compared with their concentrations in electrolyte pools.[1] The K^+ pool is inside cells; it contains almost 98% of total body potassium.[1,5] Bone is an important Ca^{2+} pool.[6] Mg^{2+} pools are inside cells and in bones.[7] Physiologically inactive forms of Ca^{2+} and Mg^{2+} bound to albumin or organic anions such as citrate can also be considered electrolyte pools.[6,7]

Numerous opposing factors influence the distribution of electrolytes between the ECF and the electrolyte pools. For example, two hormones influence Ca^{2+} distribution: parathyroid hormone (PTH) from the parathyroid glands and calcitonin from the thyroid. Calcitonin moves Ca^{2+} into bone; PTH shifts Ca^{2+} from bone into the ECF.[1,8] Unusual amounts of factors that shift electrolytes can alter their distribution and cause plasma electrolyte deficits or excesses, which are discussed later in this chapter.

Output

The normal excretory routes of fluid and electrolytes are renal (urine), GI (feces), through the skin (insensible perspiration and sweat), and the lungs (water vapor). Some of these routes (by urine and, to some degree, sweat and feces) are regulated physiologically to maintain optimal balance, but the regulatory mechanisms can be overwhelmed. Other excretory routes, such as insensible water excretion through skin and lungs, are mandatory, regardless of fluid balance.[1,9] Insensible water excretion increases when a person has a fever. Abnormal routes of fluid and electrolyte output include emesis, hemorrhage, drainage through tubes or fistulas, and other routes of fluid and electrolyte loss often seen in clinical situations.[9] These abnormal output routes do not have physiological regulatory mechanisms.

Renal excretion provides the largest output of fluid and electrolytes in normal circumstances. The hormone *aldosterone* (along with natriuretic peptides not discussed in this concept presentation) regulates renal excretion of Na^+ and water (isotonic fluid), whereas antidiuretic hormone (ADH) regulates the excretion of water.[1] Aldosterone increases renal excretion of K^+ directly and, probably, Mg^{2+} indirectly.[10]

Aldosterone

The adrenal cortex secretes aldosterone in response to angiotensin II, one of the components of the renin-angiotensin system. When the ECV is low, the resulting decreased blood flow through the renal arteries increases the release of renin, formation of angiotensin I, and then formation of angiotensin II, thus increasing aldosterone secretion. Aldosterone acts on the kidneys to remove Na^+ and water from the renal tubules and return them to the blood, which restores or even expands the ECV.[1] The liver cells normally metabolize aldosterone, which stops its action. Decreased renin release or damage to the adrenal cortex will decrease aldosterone secretion, thus increasing renal Na^+ and water excretion. Aldosterone is the major hormonal regulator of ECV.[1] Conditions involving excessive or insufficient secretion of aldosterone cause ECV imbalances.

Aldosterone also facilitates renal excretion of K^+. Increased concentration of plasma K^+ stimulates aldosterone secretion, which causes the kidneys to excrete more K^+ and helps return the plasma K^+ concentration to normal. If plasma K^+ concentration decreases, aldosterone secretion is suppressed, and the kidneys excrete less potassium. Another influence on renal excretion of K^+ is the amount of flow in distal nephrons, where K^+ is secreted into renal tubular fluid. More flow in the distal nephrons increases K^+ output in urine.[5] This situation is clinically important in osmotic diuresis and with the use of potassium-wasting diuretics, both of which cause excessive K^+ output.[11] Cortisol and other glucocorticoids have some aldosterone-like action on the kidneys.

Antidiuretic Hormone

ADH regulates renal excretion of water but not that of Na^+. Its name describes its action on the kidneys; the antidiuretic effect removes water from the renal distal tubules and collecting ducts and returns it to the blood, which dilutes the ECV and other body fluids. The posterior pituitary gland normally releases ADH at a level that maintains osmolality (degree of concentration) within normal limits. When body fluids become too concentrated (osmolality too high), osmosensitive cells in the hypothalamus trigger the release of more ADH from the posterior pituitary. Increased renal action of ADH retains more water and dilutes body fluids back to their normal osmolality.[1] On the other hand, when body fluids become too dilute (osmolality too low), the osmosensitive cells in the hypothalamus suppress the release of ADH from the posterior pituitary. Less ADH action on the kidneys allows more water excretion in the urine and concentrates body fluids back to their normal osmolality. The serum Na^+ concentration usually reflects the osmolality of body fluids. Conditions that cause excessive or deficient ADH release cause plasma Na^+ concentration imbalances.[12]

Age-Related Differences

Infants and Children

Neonates and infants are not able to communicate thirst except by crying, which can affect their fluid intake if their caregivers are not vigilant. A high percentage of their body weight is water, with more ECF than intracellular fluid. As infants grow, creating more cells, the percentage of body weight as water decreases, and the amount of intracellular fluid exceeds the amount of ECF. Those conditions persist throughout the rest of the lifespan. Because both neonates and infants have large body and lung surface areas compared with body mass, they have higher fluid exchange ratios than any other age group. In addition, neonates and infants have immature kidneys that have little reserve capacity, reaching maturation only during childhood.[13]

Older Adults

The thirst sensation is blunted in older adults. Thus, they may have a decreased fluid intake because the osmolality of their body fluids can rise higher before they become thirsty. Older adults also have a lower lean body mass, which decreases the percentage of their body weight that is water compared with that of young and middle-aged adults. Although older adults who do not have renal disease have functioning kidneys, they have decreased renal reserve because the number of nephrons in kidneys decreases with normal aging.[14-15]

VARIATIONS AND CONTEXT

The primary problems associated with this concept are imbalance of fluids and imbalance of electrolytes (see Fig. 6.1). The term *imbalance* often is used to indicate disrupted fluid or electrolyte balance. Fluid imbalances can reflect imbalance of fluid volume or imbalance of fluid concentration. Any electrolyte can be out of balance, but for the purposes of this concept presentation, the two most important electrolytes are sodium and potassium. This section explains categories of imbalances and the common causes of imbalances.

Categories of Fluid and Electrolyte Imbalances

Extracellular Fluid Volume Imbalances

ECV imbalances are abnormal amounts of fluid in the extracellular compartments (vascular plus interstitial). Fluid that has the same effective concentration as normal body fluid is called isotonic fluid.[1] Normal ECF is isotonic Na^+-containing fluid. The Na^+ is necessary to hold the water in the extracellular compartment.

There are two types of ECV imbalances. An ECV deficit is too little Na^+-containing isotonic fluid in the extracellular compartment; an ECV excess is too much Na^+-containing isotonic ECF. With ECV imbalances, the amount of isotonic fluid changes but its concentration remains the same unless an osmolality imbalance is present at the same time.

Osmolality Imbalances

Osmolality imbalances are changes in the concentration of body fluid. If osmolality changes, it equilibrates rapidly between ECF and intracellular fluid as a result of osmotic shifts of water across cell membranes. Although osmolality can be measured directly, in many clinical settings it is tracked using the serum Na^+ concentration, which usually rises or falls in parallel with osmolality. Na^+ stays in the ECF when water moves into or out of cells, which is why the serum Na^+ concentration changes when the osmolality changes.

There are two types of osmolality imbalances: hypernatremia and hyponatremia. Hypernatremia (increased serum Na^+ concentration) indicates that body fluids are too concentrated (osmolality is too high). Hyponatremia (decreased serum Na^+ concentration) indicates that body fluids are too dilute (osmolality is too low). Osmolality imbalances can occur alone or with ECV imbalances. The combination of ECV deficit and hypernatremia is known as clinical dehydration.[9]

Electrolyte Imbalances

Electrolyte imbalances are abnormal plasma concentrations of electrolytes such as K^+, Ca^{2+}, and Mg^{2+}. Although Na^+ is also an electrolyte, its concentration reflects the osmolality, as discussed previously. Electrolyte concentrations are measured from blood samples and do not necessarily correlate with the concentrations inside cells.

There are two types of electrolyte imbalances: deficits and excesses of plasma concentration. The terms for electrolyte imbalances are constructed from a prefix that indicates whether the concentration is too low (*hypo-*) or too high (*hyper-*), a root that indicates the specific electrolyte involved (e.g., *-kal-* for K^+, *-calc-* for Ca^{2+}, and *-magnes-* for Mg^{2+}), and the suffix *-emia* that signifies "in the blood." Electrolyte imbalances can occur alone or with ECV and/or osmolality imbalances.

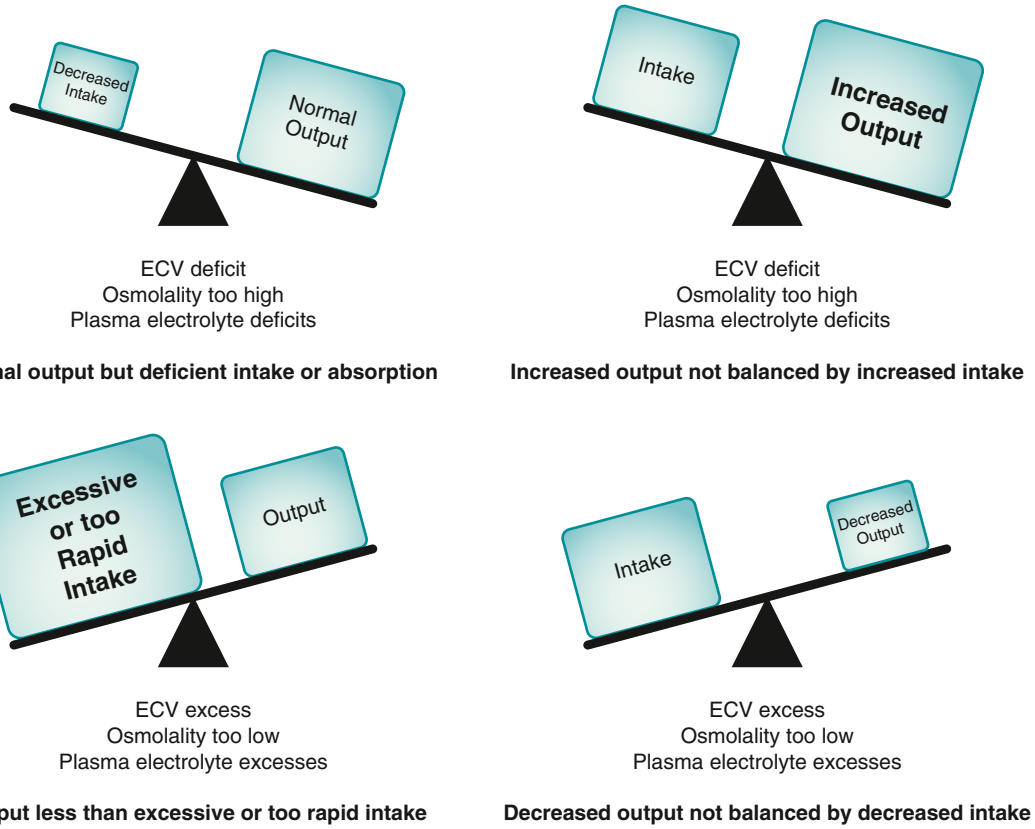


Fig. 6.3 Disrupted Balance of Fluid and Electrolytes. (A) Imbalances from fluid and electrolyte output greater than intake and absorption. (B) Imbalances from fluid and electrolyte output less than intake and absorption. *ECV,* extracellular fluid volume.

Causes of Fluid and Electrolyte Disturbances

Practically speaking, there are only three overarching causes of fluid and electrolyte imbalances. All of these imbalances involve at least one of the following conditions:

- Fluid and electrolyte output is *greater than* intake and absorption.
- Fluid and electrolyte output is *less than* intake and absorption.
- Fluid and electrolyte distribution is altered.

Output Greater Than Intake and Absorption

When fluid and electrolyte output is greater than intake and absorption, ECV deficit, increased osmolality (hypernatremia), and various plasma electrolyte deficits can occur (Fig. 6.3). Two situations cause output to exceed intake and absorption (see Fig. 6.3A):

- Normal output but deficient intake or absorption
- Increased output not balanced by increased intake

Normal output but deficient intake or absorption. Body fluid output through the combination of urine, feces, skin, and respiration is dilute Na^+-containing fluid. Therefore, daily intake of some Na^+ and considerable water is necessary to maintain optimal fluid balance. Although the kidneys are able to reduce their fluid output to some degree in response to decreased fluid intake, some renal output is obligatory, as is water output through the skin and from the lungs (respiration).[1,16] When a person's intake is less than normal output, the imbalance they develop depends on the type of fluid that is deficient. For example, people who do not drink sufficient water to match their water output can make their body fluids too concentrated (osmolality too high; hypernatremia). See hypernatremia in Box 6.1 for examples.

Deficient electrolyte intake and absorption with normal output can cause plasma electrolyte deficits such as hypokalemia or hypomagnesemia. Box 6.2 lists specific causes of electrolyte deficits caused by normal output but decreased intake or absorption.

Increased output not balanced by increased intake. Another situation in which fluid and electrolyte output becomes greater than intake arises when output increases but intake does not increase enough to balance it. For example, diarrhea increases output of Na^+, water, and K^+. During diarrhea, an intake of Na^+, water, and K^+ that does not balance the increased output creates a high risk for ECV deficit, increased osmolality (hypernatremia), and hypokalemia.[16] Boxes 6.1 and 6.2 show other examples of imbalances caused by increased output that is not balanced by increased intake. To prevent these imbalances, fluid and electrolyte intake must increase to balance increased output.

Output Less Than Intake and Absorption

When fluid and electrolyte output is less than intake and absorption, ECV excess, decreased osmolality (hyponatremia), and plasma electrolyte excesses can occur. Two situations cause intake to be greater than output (see Fig. 6.3B):

- Output less than excessive or too rapid intake
- Decreased output not balanced by decreased intake

Output less than excessive or too rapid intake. Individuals with normal renal function may overwhelm

BOX 6.1 Causes of Disrupted Fluid Balance

ECV Deficit (Too Little Extracellular Volume)

Normal Output but Deficient Intake of Na^+ and Water

- Lack of access to Na^+ and water

Increased Output Not Balanced by Increased Intake of Na^+ and Water

- Vomiting
- Acute or chronic diarrhea from any cause, including laxative abuse
- Draining GI fistula, gastric suction, or intestinal decompression
- Hemorrhage or burns
- Overuse of diuretics
- Lack of aldosterone (adrenal insufficiency, Addison disease)

Rapid Fluid Shift From ECV Into a Third Space

- Acute intestinal obstruction
- Ascites that develops rapidly

ECV Excess (Too Much Extracellular Volume)

Output Less Than Excessive or Too Rapid Intake of Na^+ and Water

- Excessive IV infusion of Na^+-containing isotonic solution (0.9% NaCl, Ringer)
- High oral intake of salty foods and water with renal retention of Na^+ and water

Decreased Output Not Balanced by Decreased Intake of Na^+ and Water

- Oliguria (e.g., acute kidney injury, acute glomerulonephritis, end-stage kidney disease)
- Aldosterone excess (e.g., cirrhosis, chronic heart failure, primary hyperaldosteronism)
- High levels of glucocorticoids (e.g., corticosteroid therapy, Cushing disease)

Hypernatremia (Body Fluids Too Concentrated; Osmolality Too High)

Normal Output but Deficient Intake of Water

- No access to water or inability to respond to or communicate thirst (e.g., aphasia, coma, infancy)
- Tube feeding without additional water intake

Increased Output Not Balanced by Increased Intake of Water

- Vomiting or diarrhea with replacement of Na^+ but not enough water
- Diabetes insipidus (lack of antidiuretic hormone)

Hyponatremia (Body Fluids Too Dilute; Osmolality Too Low)

Output Less Than Excessive or Too Rapid Intake of Water

- IV 5% dextrose in water (D_5W) infusion with excess rate or amount
- Rapid oral ingestion of massive amounts of water (e.g., child abuse, club initiation, psychiatric disorder)
- Overuse of tap water enemas or hypotonic irrigating solutions
- Massive replacement of water without Na^+ during vomiting or diarrhea

Decreased Output Not Balanced by Decreased Intake of Water

- Excessive antidiuretic hormone

ECV, Extracellular fluid volume; *GI*, gastrointestinal; *IV*, intravenous; *Na^+*, sodium ions; *NaCl*, sodium chloride.

their output capacity by excessive or very rapid intake of fluid and electrolytes. This situation most commonly occurs with IV infusions. Any person receiving IV fluid is at risk for developing fluid and electrolyte imbalances from excessive or too rapid infusion of the solution, even if the infusion is intended to replace a fluid or electrolyte deficit. The specific imbalance that develops depends on the type of IV solution being administered.[16] Nurses must be especially alert when infusing IV solutions that contain K^+ because hyperkalemia caused by too rapid infusion can cause dangerous cardiac dysrhythmias.[9,16]

Excessive oral intake that overwhelms normal output mechanisms is also possible. The most common example is the mild ECV excess that occurs when people eat salty foods and drink water. They may notice that their rings or shoes feel tight and that they have gained weight overnight. These changes resolve in a day or two as the kidneys excrete the excess Na^+ and water. People who have conditions that cause chronic ECV excess, such as cirrhosis with ascites, often are prescribed Na^+-restricted diets to avoid exacerbating their ECV excess.[16]

When people drink a lot of water without salt, they normally produce less antidiuretic hormone and their kidneys excrete the extra water. However, massive rapid oral intake of water or other hypotonic fluids can overwhelm renal water excretion capacity and make body fluids too dilute (osmolality too low; hyponatremia).[17,18] See hyponatremia in Box 6.1 for examples. Oral intake of electrolyte-rich foods by people who have normal renal function is usually not a problem because the kidneys excrete any excess.

Decreased output not balanced by decreased intake. People who have oliguria from any cause have decreased output of fluid and electrolytes; they must decrease their intake to prevent imbalances. For example, people who have acute or chronic oliguric kidney disease develop ECV excess, hyperkalemia, and hypermagnesemia unless their intake is decreased appropriately.[5,16] See other examples in Boxes 6.1 and 6.2.

Combining excessive or too rapid intake of fluid and electrolytes with decreased output creates a potentially dangerous situation in which imbalances can develop rapidly. An IV solution that infuses excess amounts or too rapidly into an individual who is oliguric can cause life-threatening ECV excess (Na^+-containing fluid) or hyperkalemia (K^+-containing fluid).[9,16]

Altered Fluid and Electrolyte Distribution

Alterations of distribution, the process of moving fluid and electrolytes between their various compartments, can create fluid or electrolyte imbalances (Fig. 6.4):

- Shift of vascular fluid into the interstitial space causes edema.
- Rapid shift of ECF into a "third space" can create ECV deficit.
- Electrolyte shift from ECF into an electrolyte pool causes plasma electrolyte deficits.
- Electrolyte shift from an electrolyte pool into ECF causes plasma electrolyte excesses.

BOX 6.2 Causes of Disrupted Electrolyte Balance

Hypokalemia (Plasma K^+ Deficit)

Normal Output but Deficient K^+ Intake

- Prolonged anorexia or diet lacking K^+-rich foods
- No oral intake plus IV solutions not containing K^+

Increased Output Not Balanced by Increased K^+ Intake

- Vomiting
- Acute or chronic diarrhea from any cause, including laxative overuse
- Use of K^+-wasting diuretics or other drugs that increase renal K^+ excretion
- Excessive aldosterone effect (e.g., large amounts of black licorice, cirrhosis, chronic heart failure, primary hyperaldosteronism)
- High levels of glucocorticoids (e.g., corticosteroid therapy, Cushing disease)

Rapid K^+ Shift From ECF Into Cells

- Alkalosis, excessive β-adrenergic stimulation, or excessive insulin

Hyperkalemia (Plasma K^+ Excess)

Output Less Than Excessive or Too Rapid K^+ Intake

- IV K^+ infusion with excess rate or amount
- Massive transfusion (>8 U for adults) of stored blood

Decreased Output Not Balanced by Decreased K^+ Intake

- Oliguria (e.g., severe hypovolemia, circulatory shock, acute kidney injury, end-stage kidney disease)
- Use of K^+-sparing diuretics, angiotensin-converting enzyme (ACE) inhibitors, or other drugs that decrease renal K^+ excretion
- Lack of aldosterone (e.g., adrenal insufficiency, Addison disease)

Rapid K^+ Shift From Cells Into ECF

- Lack of insulin or acidosis caused by mineral acids
- Massive sudden cell death (e.g., crushing injuries, tumor lysis syndrome)

Hypocalcemia (Plasma Ca^{2+} Deficit)

Normal Output but Deficient Ca^{2+} Intake or Absorption

- Diet lacking Ca^{2+}-rich foods
- Poor Ca^{2+} absorption (e.g., chronic diarrhea, lack of vitamin D)

Increased Output Not Balanced by Increased Ca^{2+} Intake and Absorption

- Steatorrhea (binds Ca^{2+} in GI secretions as well as dietary Ca^{2+})

Ca^{2+} Shift From ECF Into Bone or Physiologically Unavailable Form

- Hypoparathyroidism
- Large load of citrate from massive blood transfusion (binds Ca^{2+})
- Alkalosis (more Ca^{2+} binds albumin) or elevated plasma phosphate level
- Acute pancreatitis (Ca^{2+} binds necrotic fat in abdomen)

Hypercalcemia (Plasma Ca^{2+} Excess)

Output Less Than Excessive Ca^{2+} Intake and Absorption

- Vitamin D or Ca^{2+} overdose (includes shark cartilage supplements)

Decreased Output Not Balanced by Decreased Ca^{2+} Intake

- Use of thiazide diuretics

Ca^{2+} Shift From Bone Into ECF

- Hyperparathyroidism
- Cancers that secrete bone-resorbing factors

Hypomagnesemia (Plasma Mg^{2+} Deficit)

Normal Output but Deficient Mg^{2+} Intake or Absorption

- Diet lacking Mg^{2+}-rich foods
- Poor Mg^{2+} absorption (e.g., chronic diarrhea, ileal resection, alcohol use disorder)

Increased Output Not Balanced by Increased Mg^{2+} Intake and Absorption

- Prolonged vomiting, gastric suction, or draining GI fistula
- Steatorrhea (binds Mg^{2+} in GI secretions as well as dietary Mg^{2+})
- Use of diuretics or other drugs that increase urinary Mg^{2+}

Mg^{2+} Shift Into Physiologically Unavailable Form

- Large load of citrate from massive blood transfusion (binds Mg^{2+})
- Alkalosis (more Mg^{2+} binds albumin)

Hypermagnesemia (Plasma Mg^{2+} Excess)

Output Less Than Excessive Mg^{2+} Intake and Absorption

- Overuse of Mg^{2+}-containing laxatives or antacids

Decreased Output Not Balanced by Decreased Mg^{2+} Intake

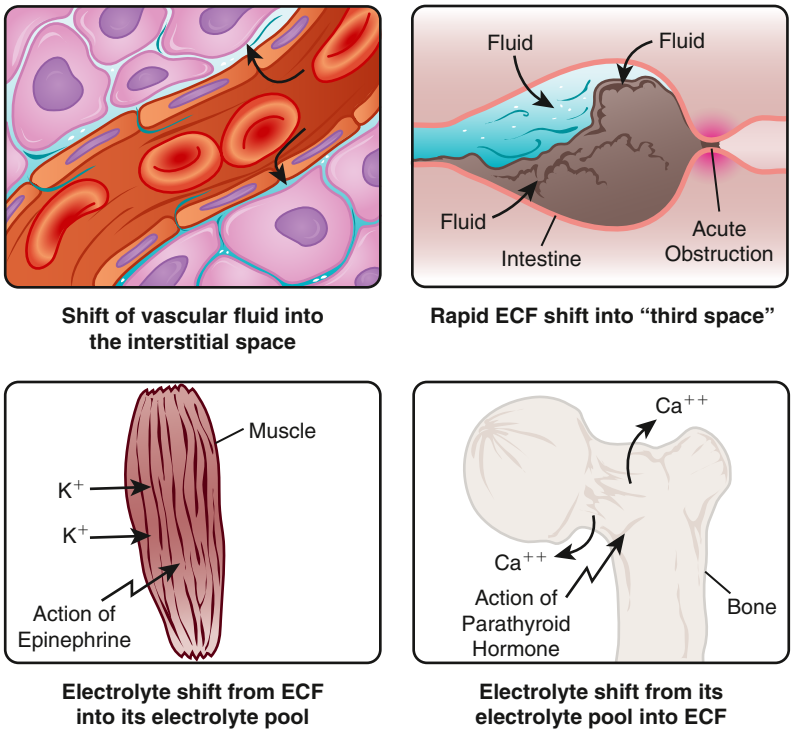
- Chronic oliguric kidney disease

Ca^{2+}, calcium ions; *ECF*, extracellular fluid; *GI*, gastrointestinal; *IV*, intravenous; *K^+*, potassium ions; *Mg^{2+}*, magnesium ions.

Shift of vascular fluid into interstitial space. As explained previously, fluid distribution between the vascular and interstitial compartments occurs by filtration, the net result of simultaneous opposing forces at the capillary level. Altered filtration can allow too much fluid to accumulate in the interstitial compartment, which is called edema. For example, ECV excess causes edema by increasing the capillary blood hydrostatic pressure. Inflammation causes edema because it involves local vasodilation (increases capillary blood hydrostatic pressure) and increased microvascular permeability (protein leakage increases the interstitial fluid colloid osmotic pressure). Edema from hypoalbuminemia is caused by decreased blood colloid osmotic pressure.

Rapid extracellular fluid shift into "third space." The term *third space* refers to a location where ECF accumulates abnormally (becomes misplaced)—a location that is neither the vascular nor the interstitial compartment.[16] The peritoneal cavity and the intestinal lumen are examples of third spaces. ECF accumulating in the peritoneal cavity creates ascites. An acute intestinal obstruction may cause ECF to shift rapidly into the intestinal lumen (see Fig. 6.4). Rapid shift of ECF into a third space can cause ECV deficit. If the shift occurs gradually, there is time for the ECV to be replenished without causing symptomatic ECV deficit.

Electrolyte shift from extracellular fluid into an electrolyte pool. The electrolytes K^+, Ca^{2+}, and Mg^{2+} have low concentrations in the ECF and high concentrations in other locations, such as inside cells or in bone, that are called *electrolyte pools*. Many factors influence the distribution of these electrolytes between the ECF and their electrolyte pools, with some factors moving electrolytes from the ECF into their pools and others moving them in the opposite direction.



Shift of vascular fluid into the interstitial space

Rapid ECF shift into "third space"

Electrolyte shift from ECF into its electrolyte pool

Electrolyte shift from its electrolyte pool into ECF

Fig. 6.4 Imbalance From Altered Fluid and Electrolyte Distribution. *Ca^{++}*, calcium ions; *ECF*, extracellular fluid; *K^+*, potassium ions.

Abnormal concentrations of the factors that shift electrolytes into their pools can cause plasma electrolyte deficits (see Fig. 6.4).[9] Although these distribution shifts may not change whole-body electrolyte concentrations, they cause signs and symptoms by changing the ratio of electrolytes inside and outside cells or the amount of physiologically active electrolyte. See hypokalemia, hypocalcemia, and hypomagnesemia in Box 6.2 for examples.

Electrolyte shift from an electrolyte pool into extracellular fluid. The factors that distribute electrolytes between ECF and electrolyte pools can be altered in a way that shifts electrolytes from their pools into ECF, causing plasma electrolyte excesses (see Fig. 6.4).[5] These distribution shifts may not change whole-body electrolyte concentrations but can cause signs and symptoms by changing the ratio of electrolytes inside and outside cells. See hyperkalemia and hypercalcemia in Box 6.2 for examples.

CONSEQUENCES

Disruptions of fluid and electrolyte balance have different physiological consequences, depending on the type of imbalance. ECV, K^+, Mg^{2+}, and Ca^{2+} imbalances can interfere with perfusion and oxygenation. Osmolality imbalances impair cerebral function.[16-18] K^+, Mg^{2+}, and Ca^{2+} imbalances impair neuromuscular function.[9,19-21]

Impaired Perfusion and Oxygenation

A normal volume of ECF is necessary to perfuse tissue and oxygenate cells. Moderate or severe ECV deficit reduces tissue perfusion by decreasing arterial blood pressure (BP). Very severe ECV deficit leads to hypovolemic shock, a condition that severely impairs perfusion and oxygenation.[22] ECV excess can also impair oxygenation. Edema fluid from ECV excess pushes cells farther from capillaries, creating a larger distance for oxygen to diffuse before it reaches cells. This subtle change is part of the reason for the delayed healing of injuries associated with edematous tissue. A more dramatic example of impaired oxygenation from ECV excess is pulmonary edema that arises from sudden or very severe ECV excess. Fluid in the alveoli interferes with gas exchange and, thus, oxygenation. K^+, Mg^{2+}, and Ca^{2+} imbalances can cause cardiac dysrhythmias, some of which can impair perfusion by reducing cardiac output.[9,16,23-24] Severe hyperkalemia causes cardiac arrest.[9]

Impaired Cerebral Function

Osmolality imbalances cause shriveling (hypernatremia) or swelling (hyponatremia) of cells, including brain cells. Impaired cerebral function occurs with either condition.[12,16] The most common cerebral impairment with osmolality imbalances is a decreased level of consciousness (LOC), which occurs on a continuum from drowsiness to coma. Seizures may occur if the osmolality changes very rapidly, rises very high, or falls very low.[16,18] Brain cell dysfunction caused by osmolality imbalance is reversible with a well-managed return of osmolality to normal, avoiding rapid changes that can injure fragile brain structures.[12,16]

Impaired Neuromuscular Function

Plasma concentration imbalances of K^+, Ca^{2+}, and Mg^{2+} impair neuromuscular function, although they do so in different ways.

The ratio of K^+ inside to outside cells is a major determinant of resting membrane potential of muscle cells.[16] Plasma K^+ deficit and excess change the resting membrane potential of skeletal muscle by altering that ratio. Although the state of the resting potential is different in hypokalemia and hyperkalemia, the effect on skeletal muscles is similar: flaccid muscle weakness.[16,19,20]

Extracellular Ca^{2+} concentration is a major determinant of the speed of ion movement through the membranes of nerve and muscle cells. Mg^{2+} suppresses release of the neurotransmitter acetylcholine at neuromuscular junctions. Plasma concentration imbalances of Ca^{2+} and Mg^{2+} impair neuromuscular function by altering these processes. Plasma deficits of Ca^{2+} and Mg^{2+} increase neuromuscular excitability, which is why hypocalcemia and hypomagnesemia have similar signs and symptoms: muscle twitching and cramping, hyperactive reflexes, and seizures if very severe. In contrast, plasma excesses of Ca^{2+} and Mg^{2+} decrease neuromuscular excitability, causing similar manifestations of muscle weakness, depressed reflexes, and lethargy.[9,16]

RISK FACTORS

Populations at Risk

Optimal fluid and electrolyte balance is necessary for the physiological function for all individuals, regardless of genetic background, culture, age, or socioeconomic status. Populations at greatest risk for imbalance are the very young and the very old. Preterm infants are at great risk for fluid and electrolyte disturbances because they have immature kidneys and large relative surface areas (given their small size) of skin and lungs; the degree of risk is related to the infant's weight and gestational age at the time of birth. Term infants and young children also have a greater risk than adults because of their immature kidneys, higher metabolic rates, and larger fluid exchange ratios.[12] Older adults have blunted thirst sensations and decreased renal reserves from the normal age-related gradual loss of nephrons, which make them more susceptible to fluid and electrolyte disturbances.[14,25]

Individual Risk Factors

The greatest individual risk factors are associated with serious injury or significant health conditions. Because so many different disease processes and behaviors can disrupt fluid and electrolyte balance, it is more useful to think about risk factors in terms of what the disease or behavior is causing rather than focus on the disease itself. Nurses can deduce logically the individual risk factors for fluid and electrolyte imbalances by considering the dynamic interplay of the processes involved in fluid and electrolyte balance, including social determinants of health that interfere with access to safe drinking water, electrolyte-rich fresh fruits and vegetables, and calcium-rich dairy products. Box 6.3 lists common situations and conditions that place an individual at risk for fluid and electrolyte imbalances. Another situation with high risk for fluid and electrolyte imbalances is hospitalization with COVID-19.

BOX 6.3 Common Risk Factors for Fluid and Electrolyte Disturbances

Conditions
- Vomiting
- Diarrhea
- Malabsorption
- Fever
- Inadequate or excessive intake of fluid or electrolytes
- Inadequate or excessive water intake

Adverse Effects From Medications
- Diuretics
- Laxatives
- Antacids
- Corticosteroids
- Infusion of IV fluids
- Blood transfusions

Acute Medical Conditions, Injury, and Trauma
- Hemorrhage
- Burns
- Crush injuries
- Head injuries
- Acute pancreatitis
- Acute kidney injury

Chronic Medical Conditions
- Heart failure
- Diabetes mellitus
- Cancer
- Chronic oliguric kidney disease
- Chronic liver disease
- Alcohol use disorder
- Eating disorders (anorexia nervosa, bulimia)

ASSESSMENT

Assessments for fluid and electrolyte imbalances often occur in the context of other conditions that cause such imbalances. Nurses can use the risk factors for these imbalances to guide their assessment.

History

Because many of the presenting signs and symptoms of fluid and electrolyte imbalances have other causes, taking a careful history is important. In addition to focusing on renal, endocrine, or other conditions that may cause the fluid or electrolyte imbalance, the history must include questions regarding fluid and electrolyte intake and output. Ask about reliable access to safe drinking water. Assess food insecurity, economic instability, access to sources of fruits and vegetables, and availability of safe storage for fresh produce and dairy products; these social determinants of health can interfere with needed

electrolyte intake. Ask regarding any recent vomiting or diarrhea; explore its frequency, duration, and quantity, and the type and quantity of water, Na^+, and K^+ replacement. Medication history, including over-the-counter drugs and dietary supplements, is an important focus because numerous medications influence fluid and electrolyte balance.[11,16,26-28]

Examination Findings

Clinical manifestations of fluid and electrolyte imbalances are often part of a larger clinical picture of the underlying disease process that caused the imbalance. For example, ankle edema, bounding pulse, and distended neck veins caused by ECV excess in individuals who have heart failure will be noted as part of the cardiac, respiratory, and functional examinations.[16] However, unless they are assessed specifically, quadriceps muscle weakness and constipation from hypokalemia may escape detection until these manifestations become severe.

A specific assessment to detect or monitor ECV excess or deficit is weighing the person daily, because 1 L of body fluid weighs 1 kg (2.2 lbs.). A gain or loss of 1 or more kg in 24 hours for adults is a gain or loss of body fluid. A similar gain or loss in a longer period may be a change in body fat or muscle rather than fluid, so daily weights are necessary for assessing ECV changes.[16,22]

Astute clinicians incorporate assessment for the individual's most likely fluid and electrolyte imbalances into every physical assessment rather than waiting until the signs and symptoms become severe. For example, a person who has chronic diarrhea needs assessment for ECV deficit, hypernatremia, hypokalemia, hypocalcemia, and hypomagnesemia in addition to assessments related to the cause of the diarrhea and its consequences on skin integrity.[9]

Tables 6.1 and 6.2 present signs and symptoms of fluid and electrolyte imbalances. These manifestations arise from the physiological consequences described previously in this chapter. Interpretation of assessment findings may be complicated by the presence of acid–base imbalances (see Concept 7, Acid–Base Balance).

Diagnostic Tests

Diagnosis of ECV deficit or excess usually is made on the basis of history and clinical examination. Laboratory tests performed on blood samples provide the definitive diagnosis for osmolality and electrolyte imbalances.[29] Normal ranges are provided in Tables 6.1 and 6.2.

TABLE 6.1 Clinical Manifestations of Disrupted Fluid Balance

EXTRACELLULAR VOLUME IMBALANCES		OSMOLALITY IMBALANCES	
Too Little Volume (ECV Deficit)	**Too Much Volume (ECV Excess)**	**Too Dilute (Hyponatremia)**	**Too Concentrated (Hypernatremia)**
Sudden weight loss, skin tenting, dry mucous membranes, vascular underload: rapid thready pulse, postural BP drop with concurrent HR increase, lightheadedness, flat neck veins when supine, oliguria, syncope, circulatory shock if severe	Sudden weight gain, dependent edema, vascular overload: bounding pulse, distended neck veins when upright, dyspnea, pulmonary edema if severe	Impaired cerebral function: decreased LOC, nausea, seizures if severe; serum Na^+ <130 mEq/L	Impaired cerebral function: decreased LOC, thirst (less with older adults), seizures if severe; serum Na^+ >145 mEq/L

BP, blood pressure; *ECV*, extracellular fluid volume; *HR*, heart rate; *LOC*, level of consciousness; *Na^+*, sodium ions.

TABLE 6.2 Clinical Manifestations of Disrupted Electrolyte Balance

PLASMA K^+ IMBALANCES		PLASMA Ca^{2+} IMBALANCES		PLASMA Mg^{2+} IMBALANCES	
Hypokalemia	**Hyperkalemia**	**Hypocalcemia**	**Hypercalcemia**	**Hypomagnesemia**	**Hypermagnesemia**
Bilateral ascending flaccid muscle weakness, abdominal distention, constipation, postural hypotension, polyuria, cardiac dysrhythmias; serum K^+ <3.5 mEq/L	Bilateral ascending flaccid muscle weakness, cardiac dysrhythmias, cardiac arrest if severe; serum K^+ >5.0 mEq/L	Increased neuromuscular excitability: positive Chvostek and Trousseau signs, muscle cramps, twitching, hyperactive reflexes, carpal and pedal spasms, tetany, seizures, laryngospasm, cardiac dysrhythmias; serum total Ca^{2+} <9 mg/dL (4.5 mEq/L)	Decreased neuromuscular excitability: anorexia, nausea, constipation, muscle weakness, diminished reflexes, decreased LOC, cardiac dysrhythmias; serum total Ca^{2+} >11 mg/dL (5.5 mEq/L)	Increased neuromuscular excitability: positive Chvostek and Trousseau signs, insomnia, hyperactive reflexes, muscle cramps and twitching, nystagmus, tetany, seizures, cardiac dysrhythmias; serum Mg^{2+} <1.5 mEq/L	Decreased neuromuscular excitability: flushing, diaphoresis, diminished reflexes, hypotension, decreased LOC, muscle weakness, respiratory depression, bradycardia, cardiac dysrhythmias; serum Mg^{2+} >2.5 mEq/L

Ca^{2+}, calcium ions; *K^+*, potassium ions; *LOC*, level of consciousness; *Mg^{2+}*, magnesium ions.

CORE COMPETENCIES

Fluid and Electrolytes

- Demonstrate clinical judgment founded on broad knowledge of fluid and electrolytes.
- Using a person-centered approach, teach individuals and families regarding prevention and management of fluid and electrolyte imbalances.
- Select, interpret, and act upon assessments related to fluid and electrolytes.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient and family needs related to fluid and electrolytes.
- Collaborate with the interprofessional team to provide patient safety and optimal management of fluid and electrolyte imbalances.

CLINICAL MANAGEMENT

Primary and secondary prevention strategies and interventions for people who have fluid and electrolyte imbalances are useful in all clinical settings.

Primary Prevention

Primary prevention of fluid and electrolyte imbalances is based on the principle that intake must balance output to maintain optimal fluid and electrolyte balance. For example, teaching people to replace body fluid output from vomiting or diarrhea with Na^+-containing fluid can prevent ECV deficit. Teaching physically active individuals optimal fluid replacement during and after exercise can prevent both ECV deficit and hyponatremia. Similarly, teaching individuals who take potassium-wasting diuretics how to increase their dietary K^+ intake and the importance of taking prescribed K^+ supplements helps prevent hypokalemia.[9,30] Teaching for people who have oliguric renal disease focuses on decreasing their intake of Na^+, K^+, and Mg^{2+} because their output is decreased.[5,9]

In addition to teaching people how to maintain optimal fluid and electrolyte balance, nurses engage in primary prevention in clinical settings when they see risk factors for various imbalances and intervene to modify intake or output appropriately.[15,25,31] For example, nurses provide accessible and palatable fluids at a patient's preferred temperature as an independent nursing intervention; they request an order for an antiemetic or antidiarrheal medication as a collaborative intervention.

Secondary Prevention (Screening)

Screening to detect disrupted fluid and electrolyte balance is not performed in the general population except as part of a routine physical exam that would include assessment for physical signs of ECV excess or deficit and standard laboratory tests including measurement of serum Na^+, K^+, and Ca^{2+} levels.

Collaborative Interventions

Because fluid and electrolyte intake is easier to modify than output, interventions to restore optimal fluid and electrolyte balance often focus on intake, although diuretics or dialysis may be used to increase output in specific situations.[24]

Fluid and Electrolyte Support

ECV deficit, hypernatremia, and plasma electrolyte deficits are treated by fluid or electrolyte replacement and by treatment of any underlying cause. ECV deficit requires isotonic Na^+-containing fluid; hypernatremia requires water; and electrolyte deficit usually requires replacement of the deficient electrolyte.[16,32] A person who has clinical dehydration will need both isotonic Na^+-containing fluid and extra water. These fluids and electrolytes can be administered orally, by IV infusion, or by other routes, depending on patient status and the resources of the setting.[2,3,25,30] Nursing responsibilities during fluid and electrolyte replacement include safely administering the replacement, measuring fluid intake and output, monitoring for complications of therapy, and teaching patients and families about the therapy.[3,9,33]

Treatments for ECV excess, hyponatremia, and plasma electrolyte excesses usually involve some type of restriction: Na^+ restriction for ECV excess; water restriction for hyponatremia; and decreased intake of the electrolyte that is excessive.[16] Nurses must be sure that people know the reason for the restriction and receive culturally appropriate teaching about how to change their diet or fluid intake. In addition to the appropriate restrictions, medications may be used to treat ECV excess, hyponatremia, and plasma electrolyte excesses.

Medication Management

In addition to fluid and electrolyte replacements mentioned previously, people who have disrupted fluid and electrolyte balance may receive other medications. Depending on the situation, these medications are directed toward various goals: to treat the underlying cause (e.g., antiemetic for imbalances caused by vomiting or vasopressin for ADH deficiency), to increase the output of fluid or electrolytes (e.g., diuretics for ECV excess or hyperkalemia), to shift electrolytes into their pools to decrease plasma concentration (e.g., insulin and glucose for acute hyperkalemia or calcitonin for acute hypercalcemia),[16] or to counteract life-threatening effects of the imbalance (e.g., calcium salts to counteract the effect of hyperkalemia on cardiac function).[16] In addition, medications that can contribute to the individual's fluid and electrolyte imbalances must be discontinued or their dosage modified.

Independent Nursing Interventions

Independent nursing interventions to provide safety and comfort are foundational for people who have fluid and electrolyte imbalances. For example, safety is high priority for patients with lightheadedness from ECV deficit, a decreased LOC from osmolality imbalances, or substantial muscle weakness from hypokalemia.[11] Comfort measures are especially important for people who must restrict fluid or Na^+. People who have fluid restrictions frequently are uncomfortable from thirst.

Interventions such as performing frequent oral hygiene, lubricating the lips, keeping fluids out of sight, providing the allowed liquids in insulated containers, and instructing people to swish fluids in their mouth before swallowing promote comfort during fluid restriction. Individuals who need to restrict Na^+ intake because of chronic ECV excess can be comforted with the knowledge that salt taste often changes after a few weeks of salt restriction, so that the food that seems tasteless at first probably will have a more enjoyable flavor in a few weeks. Learning about herbs and spices also can be helpful to individuals restricting sodium.

Nurses use many different interventions to facilitate the oral intake of fluid. People who have mild ECV deficits need Na^+-containing fluid, but those who have mild hypernatremia need oral water intake. Nurses can make the appropriate fluids available frequently, provide fluids at the individual's preferred temperature, and teach patients to keep their own intake records. Increased fluid intake is also important for individuals with hypercalcemia to prevent renal damage. Teaching people how to prevent fluid and electrolyte imbalances by balancing output with appropriate intake is extremely important. Box 6.4 summarizes nursing interventions for people with disrupted fluid and electrolyte balances.

INTERRELATED CONCEPTS

The concept of fluid and electrolytes has many interrelationships with other concepts discussed in this book. Fluid and electrolytes and **Acid–Base Balance** are closely related; changes in one can cause changes in the other, and situations such as vomiting and diarrhea can lead to both. **Hormonal Regulation** has a powerful influence on fluid and electrolytes because of the significant role hormones play in maintaining balance. **Nutrition** greatly influences fluid and electrolyte intake. **Elimination** creates fluid and electrolyte output; changes in elimination, such as oliguria and diarrhea, can disrupt fluid and electrolyte balance. Fluid and electrolyte imbalances can influence **Perfusion** and **Gas Exchange** (ECV imbalances), **Cognition** (osmolality imbalances), and **Mobility** (electrolyte imbalances that cause muscle weakness). These interrelationships are illustrated in Fig. 6.5.

CLINICAL EXEMPLARS

An exemplar of optimal fluid and electrolyte balance is a person of any age whose fluid and electrolyte output is balanced by an appropriate type and amount of intake and whose fluid and electrolyte distributions are normal. This person has ECV, osmolality, and plasma electrolyte values within the normal range.

Box 6.5 lists exemplars of disrupted fluid and electrolyte balance. Using the general individual risk factors presented previously in this concept presentation, nurses can understand

BOX 6.4 Nursing Interventions for People With Disrupted Fluid and Electrolyte Balance

- Provide safety and comfort.
- Facilitate oral intake if appropriate.
- Administer collaborative interventions:
  - Adjustment of fluid intake or output
  - Treatment of the underlying cause
- Monitor for complications of therapy.
- Teach how to prevent imbalances or when to seek help (if chronic imbalance).

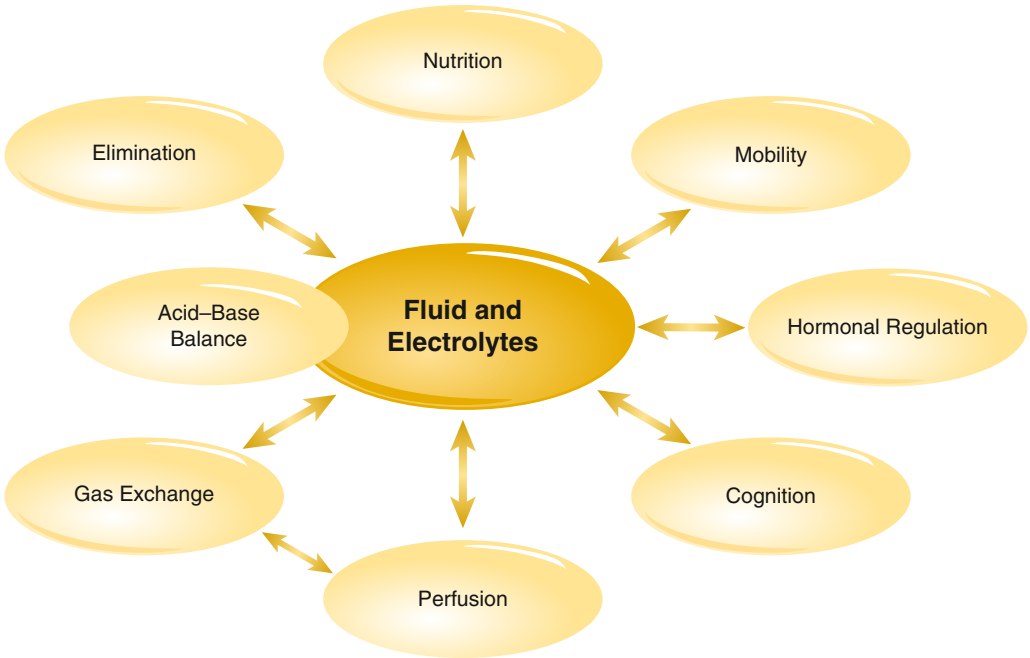


Fig. 6.5 Fluid and Electrolytes and Interrelated Concepts.

BOX 6.5 EXEMPLARS OF FLUID AND ELECTROLYTE IMBALANCE

Fluid Imbalances

- Extracellular fluid volume (ECV) deficit
- ECV excess
- Hypernatremia (increased osmolality)
- Hyponatremia (decreased osmolality, water intoxication)
- Dehydration (ECV deficit plus hypernatremia)

Electrolyte Imbalances

- Hypokalemia
- Hyperkalemia
- Hypocalcemia
- Hypercalcemia
- Hypomagnesemia
- Hypermagnesemia

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the risk factors for each exemplar. For example, hypokalemia can occur from normal output at the same time as deficient K^+ intake, increased output not balanced by increased K^+ intake, or rapid K^+ shift from ECF into cells. Specific causes of each exemplar are organized in Boxes 6.1 and 6.2 under these general individual risk factors.

Featured Exemplars

Extracellular Fluid Volume Excess

ECV excess is too much fluid volume in the vascular and interstitial compartments. Signs and symptoms of ECV excess include weight gain of 1 kg or more in 24 hours for an adult, distended neck veins when upright (vascular fluid overload), and dependent edema (interstitial fluid overload). People at high risk for ECV excess often have decreased excretion of Na^+ and water because they have oliguria or excessive amounts of aldosterone. For example, chronic heart failure decreases cardiac output, which stimulates excessive renin release, which then increases aldosterone secretion, causing ECV excess.[16] People who receive IV isotonic Na^+-containing solutions also develop ECV excess if the infusion is excessive.

Dehydration

Dehydration is the clinical combination of ECV deficit and hypernatremia, although the term sometimes is used loosely in clinical settings to indicate ECV deficit alone. ECV deficit is not enough fluid volume in the vascular and interstitial compartments; hypernatremia is abnormally increased serum Na^+ concentration, denoting increased body fluid osmolality (too concentrated). Clinical dehydration causes signs and symptoms of both conditions: weight loss of 1 kg or more in 24 hours for an adult, rapid thready pulse, postural hypotension, and flat neck veins when supine (vascular fluid underload); skin tenting (interstitial fluid underload); and decreased LOC caused by osmotic shift of water out of brain cells. Although dehydration may occur in people of any age, those with highest risk for clinical dehydration are infants, children, and older adults who have gastroenteritis (vomiting and diarrhea) and whose fluid and Na^+ output is not replaced sufficiently.[9]

Hyponatremia

Hyponatremia is abnormally decreased serum Na^+ concentration; body fluids have decreased osmolality (are too dilute). Water moves into cells by osmosis, causing them to swell. Swollen brain cells impair cerebral function, the basis of the signs and symptoms of hyponatremia.[9] People with a high risk of hyponatremia usually have had a rapid intake of large amounts of water that overwhelms their ability to excrete it renally. For example, they may receive too much IV 5% dextrose in water (D_5W) or drink massive amounts of water in a few hours.[18] People who secrete excessive ADH also develop hyponatremia because ADH causes renal retention of water that dilutes the blood.[16]

Hypokalemia

Hypokalemia is abnormally decreased plasma K^+ concentration. Intracellular K^+ may be low, normal, or even high. Skeletal muscle weakness, constipation, and cardiac dysrhythmias occur from the abnormal K^+ distribution. People at high risk for hypokalemia usually have increased K^+ output that they have not balanced with increased K^+ intake. For example, diarrhea increases fecal K^+ output; aldosterone excess, K^+-wasting diuretics, and cortisol excess all increase renal K^+ output.[9–11,23] Other people at high risk for hypokalemia have chronically low K^+ intake or rapid shifts of K^+ from the ECF into cells.[17]

Hypercalcemia

Hypercalcemia is abnormally increased plasma Ca^{2+} concentration. Signs and symptoms include constipation and decreased LOC. People at high risk for hypercalcemia usually have a shift of Ca^{2+} from their bones into the ECF. The two most common examples are hyperparathyroidism and cancer that secretes circulating substances that act like PTH and remove Ca^{2+} from bones.[6,8]

Hypomagnesemia

Hypomagnesemia is an abnormally decreased plasma Mg^{2+} concentration. It increases neuromuscular excitability, causing muscle cramps, hyperactive reflexes, cardiac dysrhythmias, and even seizures, depending on its severity.[34] The people most at risk for hypomagnesemia have low Mg^{2+} intake or absorption or have increased Mg^{2+} output that is not balanced by increased Mg^{2+} intake. For example, people with alcohol use disorder have very high risk for hypomagnesemia from a combination of decreased Mg^{2+} intake, Mg^{2+} malabsorption, and increased Mg^{2+} output through vomiting and increased renal excretion.[34] People who receive massive citrated blood transfusions are also at high risk for hypomagnesemia because the citrate binds Mg^{2+}, making it physiologically unavailable.[17]

CASE STUDY

Case Presentation

Mrs. Malone, age 83 years, lives in an apartment with her cat. She has hypertension, hyperlipidemia, and chronic heart failure, which are managed with the diuretic furosemide, potassium chloride supplements, several other medications, and dietary Na^+ restriction. Mrs. Malone volunteers at a nearby elementary school, where earlier in the week several students were sent home sick after vomiting. Mrs. Malone developed vomiting and diarrhea. Although the vomiting stopped, the diarrhea persisted. She drank more water than usual, ate rice and dry toast, and stopped taking her potassium supplements to avoid upsetting her stomach. After 2 days of diarrhea, Mrs. Malone became lightheaded when she got out of bed and had difficulty standing up after using the toilet because her legs were so weak. She telephoned her nurse practitioner (NP), who advised her to drink some broth with salt in it as well as some orange juice. Because she was used to restricting her Na^+ intake, Mrs. Malone needed considerable teaching from her NP about the importance of Na^+ intake to replace her increased Na^+ output from diarrhea, but eventually she did agree to try the rehydration schedule that her NP advised. After checking back by telephone later in the day and learning that Mrs. Malone no longer was lightheaded but still had "weak legs," the NP advised Mrs. Malone to restart her potassium chloride supplement, continue drinking orange juice, and make an appointment to have her plasma K^+ concentration checked.

Case Analysis Questions

1. Review Fig. 6.1. Based on the information presented in the case, where do you suspect Mrs. Malone falls on the ECV and potassium continuums?
2. What risk factors for fluid and electrolyte imbalance does Mrs. Malone have?
3. Describe the mechanisms that led to her fluid and electrolyte imbalances.

From Barbara Penoyar/Photodisc/Thinkstock.

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CONCEPT 7

Acid–Base Balance

Linda Felver

The human body requires precise control of multiple physiologic processes for optimal function. The concentration of hydrogen ions in body fluids influences cellular function, and, thus, organ, system, and whole person function. An abnormal hydrogen ion concentration impairs cellular and organ function and can be fatal. The body maintains the hydrogen ion concentration within the normal range by continuously making adjustments through specific processes. Nurses providing care to acutely and chronically ill patients must understand these processes to optimize their function. This concept presents an analysis of acid–base balance, including the recognition and management of acid–base imbalances when they occur.

DEFINITION

For the purposes of this concept presentation, acid–base balance is defined as *the process of regulating the pH, bicarbonate concentration, and partial pressure of carbon dioxide of body fluids.* The definitions of acid and base are the foundation for the concept of acid–base balance. An *acid* is a substance that releases hydrogen ions (H^+), and a *base* is a substance that takes up H^+. The most important base in the body is bicarbonate (HCO_3^-). The pH of a solution, technically defined later in this concept presentation, is a measure of its degree of acidity. A low pH means the solution is acidic; a high pH means it is basic (alkaline).

Acid–base balance is a dynamic interplay between three processes: acid production or intake, acid buffering, and acid excretion. *Acid production* is the generation of acid through cellular metabolism. Our cells continuously generate two kinds of acid during metabolism: carbonic acid (H_2CO_3) and metabolic acids. Although the chemical structures of metabolic acids vary, both normal and abnormal types of cellular metabolism generate metabolic acids. Occasionally, *acid intake* occurs, which involves entry into the body of acids or substances that the body converts to acids (acid precursors). *Acid buffering* is a process by which body fluids resist large changes in pH when acids or bases are added or removed. Body fluids normally have buffers, which are pairs of chemicals that take up H^+ or release it to keep pH in the normal range. *Acid excretion* is the removal of acid from the body. These concepts are described in greater detail later in this concept presentation.

Acid–base balance is described as a dynamic interplay because acid production is occurring constantly, the body fluids constantly have cellular acids added to them that must be buffered to preserve function, and the acid excretion mechanisms must function continuously to keep acids from accumulating in the body. Optimal acid–base balance keeps the pH of the blood and body fluids within the normal physiologic range (7.35 to 7.45 for adults).[1]

SCOPE

Considered conceptually, the scope of acid–base balance is on a continuum from acidotic (lower than normal pH) on one end to optimal balance (normal pH and other parameters) in the middle and alkalotic (higher than normal pH) on the other end (Fig. 7.1). These link to three categories associated with this concept: optimal acid–base balance and two types of disrupted acid–base balance—acidosis (too much acid) and alkalosis (too little acid). The term acid–base imbalance often is used to indicate disrupted acid–base balance.

NORMAL PHYSIOLOGICAL PROCESS

The processes whose dynamic interplay is involved in acid–base balance are acid production, acid buffering, and acid excretion. When optimal acid–base balance is occurring, the buffers are not overwhelmed by the amount of acid that is generated and acid excretion keeps pace with acid production. The blood pH and other measures of acid–base status are in the normal range (7.35 to 7.45 for adults; a wider range for infants). This section explains these functions in detail. The process is illustrated in Fig. 7.2.

Acid Production

Cellular metabolism continuously generates carbonic acid and metabolic acids. Increased cellular metabolism produces more of these acids.

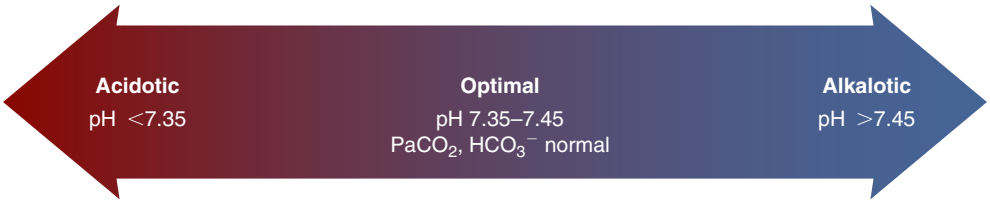

FIG. 7.1 Scope of Concept of Acid–base Balance Ranges from Optimal Balance to Acidotic and Alkalotic Imbalances.

Carbonic Acid Production

Cellular metabolism generates carbonic acid (H_2CO_3) in the form of carbon dioxide (CO_2) and water (H_2O). The enzyme carbonic anhydrase in erythrocytes and other cells facilitates the conversion in either direction, depending on the location in the body. In the tissues, where CO_2 is abundant because it is being produced, the excess CO_2 in the blood drives the equilibrium toward making H_2CO_3. H_2CO_3 is a weak acid, which means that it dissociates (separates into H^+ and HCO_3^-) only partially in solution:

$$\underset{\text{carbon dioxide + water}}{CO_2 + H_2O} \leftrightarrows \underset{\text{carbonic acid}}{H_2CO_3} \leftrightarrows \underset{\text{bicarbonate + hydrogen ion}}{HCO_3^- + H^+}$$

Bicarbonate in the blood is transported to the lung capillaries, where the CO_2 level is low because CO_2 diffuses into the alveoli and is exhaled. Carbonic anhydrase in the lungs converts H_2CO_3 back to CO_2 and H_2O, the form in which it is excreted through exhalation.

Metabolic Acid Production

Metabolic acid, the other type of acid produced by cellular metabolism, is a general term that includes all acids except carbonic acid. Examples of metabolic acid are citric acid, pyruvic acid, and lactic acid. Cells can produce abnormal metabolic acids, such as the ketoacid β-hydroxybutyric acid, when cellular metabolism is disrupted or incomplete.[2] The symbol that represents all metabolic acids is HA. The A indicates anion, which means negatively charged particle. Because these are weak acids, some, but not all, of these molecules dissociate into H^+ and A^-. Metabolic acids move from the cells that produce them into the body fluids, where they are buffered before they reach the kidneys, where they are excreted.

Acid Buffering

Buffers help keep the pH of the blood and other body fluids in the normal range despite the metabolic acid continuously produced by the cells. A buffer is a pair of chemicals (a weak acid and its base) that are in equilibrium in a solution. These two parts of a buffer system must be present in a specific ratio to keep the pH normal. The most important buffer in the extracellular fluid is the bicarbonate buffer system, which consists of carbonic acid (the weak acid) and bicarbonate (its base).[1] When the bicarbonate-to-carbonic acid ratio is 20:1, the blood pH is in the normal range. If the ratio changes significantly, the blood pH becomes abnormal.

The bicarbonate buffer system buffers metabolic acid that is produced by cells or ingested. The bicarbonate portion of the buffer combines with the H^+ from the metabolic acid to make carbonic acid:

$$H^+ + HCO_3^- \leftrightarrows H_2CO_3$$

This process could decrease the available bicarbonate and increase the concentration of carbonic acid, but normally the 20:1 ratio of bicarbonate to carbonic acid is restored immediately because the lungs excrete the carbonic acid as CO_2 and water. Most of the function of bicarbonate buffers in normal physiology is buffering metabolic acid. Bicarbonate buffers cannot buffer carbonic acid because carbonic acid is part of the

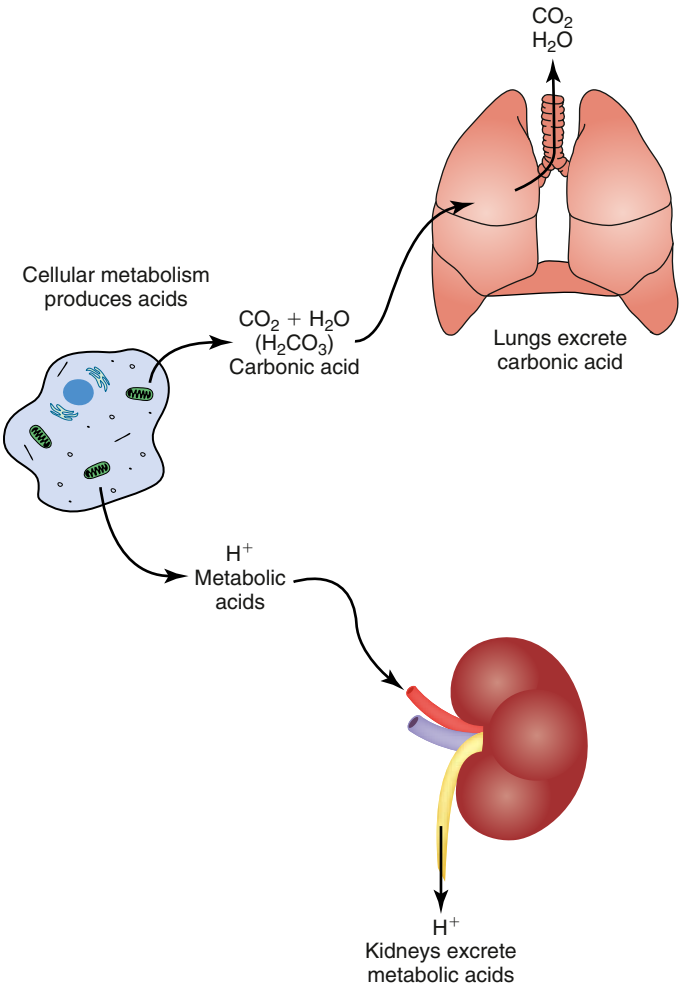

FIG. 7.2 Acid Production and Excretion. (From Potter, P. A., Perry, A. G., Stockert, P., & Hall, A. [2013]. *Fundamentals of nursing.* [8th ed.]. St Louis: Mosby.)

buffer. If too much metabolic acid is present, the plasma bicarbonate concentration decreases below its normal range because so much bicarbonate was used in buffering.[3]

In abnormal circumstances in which too little metabolic acid is present, the carbonic acid portion of the bicarbonate buffer system will release H^+. This process simultaneously raises the bicarbonate concentration and may restore the pH. However, if entirely too little metabolic acid is present, the plasma bicarbonate concentration increases above its normal range. Thus, the plasma bicarbonate concentration is an indicator of the metabolic acid status in the blood.

Acid Excretion

The two types of acid produced by cellular metabolism differ in that carbonic acid is converted to gases and metabolic acid is not. The lungs excrete the gaseous form of carbonic acid, and the kidneys excrete metabolic acid.

Carbonic Acid Excretion

The lungs serve as the excretory organ for carbonic acid. The lungs are not able to excrete metabolic acid because it cannot be converted into a gaseous form. Changes in respiratory rate and depth alter the amount of carbonic acid that is excreted. Hyperventilation (increased rate and depth of respiration) excretes more carbonic acid; hypoventilation (decreased rate and depth of respiration) excretes less carbonic acid. The chemoreceptors influence respiratory rate and depth in response to blood levels of CO_2 and H^+ and, in some situations, oxygen. When the amount of CO_2 increases in the blood, the chemoreceptors increase the respiratory rate and depth,[1] which excretes more CO_2 and H_2O (carbonic acid) and helps restore the CO_2 level to its normal range. If the blood has too little CO_2, the chemoreceptors decrease the respiratory rate and depth, which enables the CO_2 level to rise to its normal range because the cells constantly are producing it. These are examples of *correction:* fixing the problem and returning the blood values to their normal range.

Because chemoreceptors respond to H^+ concentration as well as to blood levels of CO_2, they modify respiratory rate and depth in response to the level of metabolic acid as well as carbonic acid. If too much metabolic acid accumulates, the chemoreceptors trigger hyperventilation (increased respiratory rate and depth).[1,3] This does not correct the problem because the lungs cannot excrete metabolic acid, but hyperventilation removes more carbonic acid from the body, thus making the blood less acidic. The result is too little carbonic acid, which helps balance the excess metabolic acid. The technical term for this process is *compensation:* moving the pH toward its normal range while making other blood values abnormal. If too little metabolic acid is present, the chemoreceptors cause hypoventilation.[4] This compensatory process moves the pH down toward its normal range by allowing too much carbonic acid to help balance the too little metabolic acid.

Metabolic Acid Excretion

The kidneys excrete metabolic acid but are unable to excrete carbonic acid. They have several mechanisms for excreting metabolic acid. Glomerular filtrate that enters the renal tubules contains HCO_3^- from blood. Cells that line the renal proximal tubules perform chemical processes that essentially take H^+ from the blood and secrete it into renal tubular fluid while moving HCO_3^- in the opposite direction, from the renal tubules into blood. The A^- portion of metabolic acids enters renal tubular fluid in the proximal tubules as well. Infants and older adults have reduced ability to excrete large amounts of metabolic acids.[5,6]

The secretion of metabolic acid into the renal tubules adds free H^+ to the fluid, which potentially could damage renal cells. However, many of these H^+ combine with other molecules in the renal tubular fluid, and they no longer influence the pH. For example, renal tubular fluid contains buffers, especially phosphate buffers that were filtered at the glomerulus. Many of the secreted H^+ are buffered; buffered H^+ in urine are called *titratable acid.* Additional H^+ bind to ammonia (NH_3) that distal renal tubular cells produce when additional metabolic acid needs to be excreted.[7] The H^+ that become part of ammonium ions (NH_4^+) do not contribute to the pH. NH_4^+ ions do not return to the cells but remain in the renal tubular fluid and are excreted in the urine:

$$H^+ + NH_3 \leftrightarrows NH_4^+$$

By adjusting their H^+ secretion rate and the amount of NH_3 they make, the kidneys are able to excrete more or less metabolic acid, which assists in maintaining optimal acid–base balance. If too much metabolic acid is present in the blood, the kidneys increase their secretion of H^+ and make more NH_3. These mechanisms correct the problem by removing more H^+ and A^- from the blood and simultaneously increasing blood HCO_3^- concentration (moves the opposite direction from the H^+). Similarly, if too little metabolic acid is present, the kidneys decrease their secretion of H^+ and make less NH_3 so that more metabolic acid remains in the blood and more HCO_3^- is excreted in the urine. These corrective mechanisms normalize the pH by fixing the problem.

If too much carbonic acid accumulates, the kidneys cannot excrete it, but they can excrete more metabolic acid than usual.[7] This renal response to decreased pH compensates for the problem by causing too little metabolic acid in the blood, which somewhat balances the excess carbonic acid. Similarly, if the pH increases because there is too little carbonic acid, the renal compensatory response is less secretion of H^+ and less generation of NH_3. The resulting increase of metabolic acid is an attempt to balance the lack of carbonic acid, normalizing the pH by making other blood values abnormal.

Age-Related Differences

Infants and Children

Infants have several pertinent physiologic differences from adults as it relates to acid–base balance. An infant has a much greater percentage of total body weight attributed to fluid (75%) compared with a young or middle-aged adult (60%), more extracellular fluid than intracellular fluid, and an immature renal system that is inefficient in excreting a sudden acid load.[5] In addition, an infant's metabolic rate is higher than that of an

adult. These differences place infants at higher risk for metabolic acidosis, as well as fluid and electrolyte imbalances, compared with older children and adults.

Older Adults

A normal physiologic change associated with aging is reduced size and function of the kidneys, which play a critical role in maintaining acid–base balance.[6] Despite this age-related gradual loss of nephrons, the kidneys of the older adult typically are able to manage their role in fluid, electrolyte, and acid–base balance under normal circumstances. However, older adults have reduced renal reserve. They are less able to excrete a large acid load renally, and their ability to compensate may be less effective. This makes older adults more susceptible to acid–base disturbances, as well as to fluid and electrolyte imbalances.

VARIATIONS AND CONTEXT

Conceptually, variations in acid–base balance are referred to as acid–base imbalance, of which there are two major categories: acidosis and alkalosis. Each of these categories has two underlying subtypes: respiratory and metabolic (Fig. 7.3). When these conditions are developing, the body attempts to manage the changing acid–base balance through the corrective and compensatory responses described previously. Table 7.1 summarizes the corrective and compensatory responses to disrupted acid–base balance.

Acidosis (Too Much Acid)

In a situation of too much acid, the buffers have been overwhelmed and body fluids have too much acid. Acid excretion is not able to keep up with acid production or intake. Conditions of too much acid are called *acidosis* and are given an additional descriptor that explains whether there is too much carbonic acid or too much metabolic acid. Because the lungs excrete carbonic acid, the condition of too much carbonic acid is called *respiratory acidosis.*[1,7] Similarly, because the kidneys excrete metabolic acid, the condition of too much metabolic acid is called *metabolic acidosis.* In some cases of metabolic acidosis, the base bicarbonate has been lost from the body, which causes relatively too much metabolic acid. In situations of too much acid, the pH is below the normal range (or in the low part of the normal range), and some other measures of acid–base status are abnormal. These laboratory values are explained in the Assessment section.

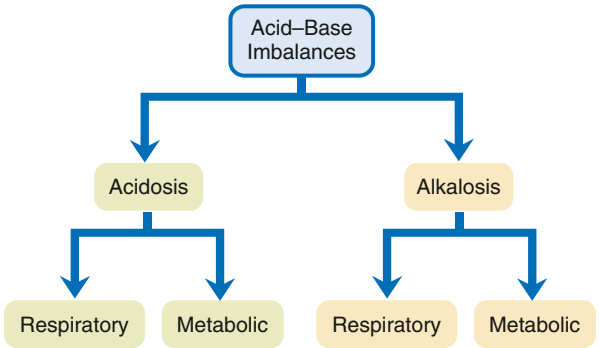

FIG. 7.3 Categories of Acid–Base Imbalances.

Alkalosis (Too Little Acid)

In situations of too little acid, the buffers also are not able to keep the pH in the normal range and body fluids do not have enough acid. Too much of the base HCO_3^- has been added to the buffer system or acid excretion is greater than acid production. Conditions of too little acid are called *alkalosis*—either *respiratory alkalosis* when there is too little carbonic acid or *metabolic alkalosis* when there is too little metabolic acid.[1,7] In these situations of too little acid, the pH is above the normal range (or in the high part of the normal range) and some other measures of acid–base status are abnormal. The Assessment section explains these measures.

CONSEQUENCES

A firm grasp of the physiologic processes that comprise acid–base balance makes it possible to understand the consequences when these processes are disrupted. Acid–base imbalances trigger compensatory mechanisms, as described previously. The time course of those mechanisms has important clinical implications. In addition to triggering compensatory mechanisms, pH changes impair cellular and organ function.

Time Course of Compensatory Mechanisms

Disruptions of acid–base balance cause the blood pH to move outside its normal range. In these situations, the buffers have been overwhelmed and the acid excretion mechanisms must work to keep the pH from reaching the fatal limits. If the pH falls abnormally low from too much acid, both the lungs and the kidneys will excrete more acid, even though only one of these organs will be excreting the type of acid that is excessive. The

TABLE 7.1 Respiratory and Renal Responses to Disrupted Acid–Base Balance

Stimulus	Respiratory Response	Renal Response
Too much carbonic acid (respiratory acidosis)	**Cause of Problem:** Hypoventilation **Correction:** Hyperventilation	**Compensation:** Increased secretion of H^+ More NH_3 production
Too little carbonic acid (respiratory alkalosis)	**Cause of Problem:** Hyperventilation **Correction:** Hypoventilation	**Compensation:** Decreased secretion of H^+ Less NH_3 production
Too much metabolic acid (metabolic acidosis)	**Compensation:** Hyperventilation	**Cause of Problem:** More metabolic acid than kidneys can excrete **Correction:** Increased secretion of H^+ More NH_3 production
Too little metabolic acid (metabolic alkalosis)	**Compensation:** Hypoventilation	**Cause of Problem:** More bicarbonate than kidneys can excrete (too little metabolic acid) **Correction:** Decreased secretion of H^+ Less NH_3 production

other organ is compensating. Depending on the time course and the severity of the problem, the disruption may be uncompensated, partially compensated, or fully compensated.[1]

As explained in the previous section, if a problem with the respiratory system disrupts acid–base balance and the lungs are unable to correct it, renal compensatory mechanisms adjust the pH toward normal. It takes several days for renal compensatory mechanisms to become clinically significant[1,7]; therefore, a short-lived respiratory acidosis or alkalosis will not become compensated. Rapid treatment of an acute respiratory acidosis will correct the problem before renal compensation can occur. On the other hand, people who have chronic respiratory acidosis or an acute episode that lasts several days do develop some degree of renal compensation, either partial or full. Episodes of respiratory alkalosis occur from hyperventilation and it is uncommon, but possible, for them to last long enough for renal compensation to occur.

Analogously, if a problem with the kidneys disrupts acid–base balance and the kidneys are unable to correct it, respiratory compensatory mechanisms adjust the pH toward normal.[7] Respiratory compensation begins within a few minutes after the pH becomes abnormal, so it is common to have some degree of compensation for a disruption of acid–base balance that involves too much or too little metabolic acid. When the disruption is severe, it will be only partially compensated.[1,7] In cases of metabolic alkalosis (too little metabolic acid), compensatory hypoventilation is limited by the respiratory drive for oxygen, so that full compensation usually does not occur.[8] It is important to realize that even if compensatory mechanisms do not return the pH to the normal range, they do prevent pH from becoming more abnormal.

Impaired Cellular and Organ Function

Disruptions of acid–base balance alter cell function, especially in the brain. The disorders involving carbonic acid (respiratory acidosis and alkalosis) generally cause more neurologic signs and symptoms than those involving metabolic acid (metabolic acidosis and alkalosis).[1,9] This difference occurs because CO_2 from carbonic acid crosses the blood-brain barrier easily and changes the pH of cerebrospinal fluid rapidly. Metabolic acid and HCO_3^- cross the blood-brain barrier with difficulty and produce fewer neurologic manifestations or cause them more slowly.

The enzymes inside cells work most effectively when pH is in the normal range. Abnormal extracellular pH can cause intracellular pH to change, especially with respiratory acidosis and alkalosis. The resulting change in enzyme activity contributes to cell dysfunction. Acidosis decreases the level of consciousness (LOC). With alkalosis, initial excitation may occur, followed by decreased LOC if the pH increase becomes more severe.[1] In addition to brain cell dysfunction that causes altered LOC and other neurologic manifestations, cardiac cell dysfunction from acid–base imbalances can cause dysrhythmias.[1] Concurrent potassium imbalances caused by acid–base imbalances also cause cardiac dysrhythmias.

RISK FACTORS

Populations at Risk

All individuals, regardless of genetics, culture, age, or socioeconomic status, need optimal acid–base balance for physiologic function. From a population perspective, those at greatest risk for acid–base disturbances are the very young and the very old. Preterm infants are at great risk for acid–base disturbances due to immature lungs, kidneys, thermoregulation, and metabolic processes; the degree of risk is largely related to the weight and gestational age at the time of birth. Term infants also have greater risk than adults due to immature kidneys and elevated metabolic rate.[5]

Older adults have decreased renal reserve due to a normal gradual loss of nephrons, making their ability to correct and to compensate for imbalances less effective.[6] Thus, they are more susceptible to acid–base disturbances than younger adults.

Individual Risk Factors

Acid–base imbalances usually occur as a consequence of another underlying condition. The most common underlying conditions associated with acid–base disturbances are presented in Box 7.1. These are organized under general causes that provide a framework for remembering the conditions. For example, respiratory acidosis (too much carbonic acid) can arise from alveolar hypoventilation, ineffective neuromuscular action of the chest respiratory pump, or suppression of the neural drive from the brainstem that triggers respiration. These factors impair excretion of carbonic acid. Nurses can use these categories to understand specifically how the exemplars cause respiratory acidosis and to generalize their knowledge to other conditions that cause respiratory acidosis by similar mechanisms. Nurses can also deduce logically the risk factors for acid–base imbalance by considering the processes whose dynamic interplay creates acid–base balance. Those at greatest risk for acid–base imbalances are individuals who have at least one of the following risk factors[10]:

- Excessive production or intake of metabolic acid
- Altered acid buffering due to loss or gain of bicarbonate
- Altered acid excretion
- Abnormal shift of H^+ into cells

Excessive Production or Intake of Metabolic Acid

The cells are capable of making excessive amounts of metabolic acid that overwhelm the acid buffering and excretory capacities. A common clinical example of too much metabolic acid due to acid production is diabetic ketoacidosis (DKA), in which abnormal cellular metabolism caused by lack of insulin produces ketoacids faster than the kidneys are able to excrete them.[1,2,11] DKA is a type of metabolic acidosis; it most commonly occurs with type 1 diabetes but may also occur with type 2 diabetes. People with diabetes who have economic instability and/or food insecurity, two of the social determinants of health, have increased risk of developing DKA due to insulin rationing and/or insufficient food intake.[12] Other high-risk populations for ketoacidosis are people who do not have enough carbohydrate intake and people with alcohol use disorder.[13,14] In addition to the production of excessive metabolic acid within the body, excessive intake of acid or acid precursors also causes metabolic acidosis. Although metabolic acidosis from intake of acid or acid precursors is less common, it is significant clinically in people who accidentally ingest boric acid (intended for ant poisoning) or who drink methanol, hand sanitizer (contains isopropanol and also may be contaminated with methanol), or antifreeze (an acid precursor).[15-17]

BOX 7.1 Common Underlying Conditions Leading To Acid–Base Imbalance

Respiratory Acidosis (Too Much Carbonic Acid)

Alveolar Hypoventilation

- Type B COPD (chronic bronchitis)
- End-stage type A COPD (emphysema)
- Severe asthma episode
- Bacterial pneumonia
- Pulmonary edema

Ineffective Respiratory Pump

- Guillain–Barré syndrome

Central Suppression of Respiration

- Opioid overdose

Metabolic Acidosis (Too Much Metabolic Acid)

Excessive Production or Intake of Metabolic Acid

- Diabetic ketoacidosis
- Starvation ketoacidosis
- Alcohol-related ketoacidosis
- Lactic acidosis (from tissue anoxia)
- Thyroid storm

Decreased Excretion of Metabolic Acid

- Oliguria from any cause

Loss of Bicarbonate

- Prolonged diarrhea
- Draining intestinal or pancreatic fistula

Respiratory Alkalosis (Too Little Carbonic Acid)

Hyperventilation

- Acute hypoxia
- Acute pain
- Acute anxiety or emotional distress
- Central stimulation of respiration by inflammation from head injury or meningitis

Metabolic Alkalosis (Too Little Metabolic Acid)

Gain of Base (Bicarbonate)

- Excessive ingestion or infusion of $NaHCO_3$
- Massive blood transfusion (citrate metabolized to HCO_3^-)
- Diuretic therapy (contraction alkalosis)

Excessive Excretion of Metabolic Acid

- Repeated vomiting
- Mineralocorticoid excess

COPD, Chronic obstructive pulmonary disease.

In summary, risk factors for excessive production or intake of metabolic acid include the risk factors for ketoacidosis or poisoning with acids or substances the body converts to acid. All of these situations place people at risk for metabolic acidosis. The cells cannot stop producing metabolic acid, so decreased acid production is not a risk factor for acid–base imbalance.

Altered Acid Buffering Due to Loss or Gain of Bicarbonate

The base bicarbonate is a component of the major buffer system that buffers metabolic acids. It is possible to lose or gain bicarbonate and, thus, alter the buffering capacity. People who lose a significant amount of bicarbonate, such as through prolonged diarrhea, lose buffering capacity and have relatively too much metabolic acid. Thus, bicarbonate *loss* causes metabolic acidosis.[1,7] Conversely, gaining a significant amount of bicarbonate, such as by ingesting baking soda (sodium bicarbonate) as an antacid or by receiving excessive intravenous (IV) sodium bicarbonate, makes too much bicarbonate buffer available, creating too little metabolic acid. Thus, bicarbonate *gain* causes metabolic alkalosis.[1,8] In summary, risk factors for altered acid buffering include prolonged diarrhea and excessive sodium bicarbonate intake in people of any age.[10] These conditions place them at risk for metabolic acidosis or metabolic alkalosis.

Altered Acid Excretion

Cellular metabolism generates two types of acid that are excreted by two different organ systems. For this reason, altered acid excretion occurs in many disease processes that affect lung and kidney function. Carbonic acid excretion occurs by gas exchange in the lung alveoli followed by exhalation; thus, it is possible to decrease or increase carbonic acid excretion by changing respiratory rate and depth. People at high risk for decreased carbonic acid excretion have acute or chronic respiratory diseases or other conditions that interfere with alveolar ventilation.[10] The cells continue producing carbonic acid, but the respiratory system is unable to excrete enough of it. The result is respiratory acidosis—too much carbonic acid. For example, people who have type B chronic obstructive pulmonary disease (COPD) (chronic bronchitis) have decreased carbonic acid excretion due to structural changes in their lungs and excessive mucus production that obstructs airflow.[1] They develop chronic respiratory acidosis, as do people of any age who have severe acute respiratory conditions that impair carbonic acid excretion, such as pneumonia.[18] Infants and small children have increased risk of respiratory acidosis with acute conditions because their airways have such small diameters.

Although decreased carbonic acid excretion is the most common problem with carbonic acid excretion, it is possible to excrete excessive carbonic acid through hyperventilation.[19,20] This situation causes too little carbonic acid, creating respiratory alkalosis. High-risk populations for too little carbonic acid due to hyperventilation include people who are hypoxic, are experiencing acute pain, or are upset and anxious.[19,21] These conditions that cause respiratory alkalosis tend to be more short-term than many causes of respiratory acidosis, although hyperventilation may be prolonged in hypoxic patients with COVID-19.

Excretion of metabolic acid also may be altered, either decreased or increased. People who have prolonged oliguria for any reason cannot excrete enough of the metabolic acids that their cells continue to produce. Thus, they develop metabolic acidosis. These high-risk populations include people of any age with acute or chronic oliguric kidney disease and those with circulatory shock.[22-24] Infants have immature kidneys that are not yet fully effective in excreting metabolic acid; older adults often have reduced ability to excrete a metabolic acid load.[5,6] These difficulties in excreting metabolic acid make

them vulnerable to metabolic acidosis, especially in conjunction with increased acid production or intake.

Increased excretion of metabolic acid through the kidneys can occur in people with excessive aldosterone; however, the most common condition involving excessive removal of metabolic acid from the body is vomiting,[25] which removes hydrochloric acid. Vomiting also triggers bicarbonate retention by the kidneys, which alters the buffering capacity and contributes to the resulting metabolic alkalosis.

In summary, risk factors for altered acid excretion include respiratory or other conditions that interfere with the ability to excrete enough carbonic acid, conditions causing hyperventilation that excretes too much carbonic acid, kidneys that are unable to excrete enough metabolic acid, and situations in which the kidneys or repeated episodes of vomiting remove too much metabolic acid from the body.[8]

Abnormal Shift of H^+ into Cells

Factors that shift substantial numbers of H^+ into cells can cause too little acid to be in the blood. The most common example in this category of risk factors is hypokalemia (abnormally low plasma potassium concentration).[8] When hypokalemia is present, some potassium ions (K^+) leave cells and H^+ enter cells to maintain a balance of electrical charge. The result is too little metabolic acid in the blood, known as metabolic alkalosis. The primary risk factor for abnormal shift of H^+ into cells is hypokalemia. Risk factors for hypokalemia are discussed in Concept 6, Fluid and Electrolytes.

ASSESSMENT

Disruptions of acid–base balance almost always result from other conditions. For this reason, assessments of acid–base status usually are performed in the context of other conditions.

History

Clinical manifestations associated with disrupted acid–base balance often are caused by an underlying condition and associated fluid and electrolyte imbalances. Acid–base imbalances cause nonspecific signs such as decreased LOC that have many possible causes. It is critical that nurses consider presenting symptoms in the context of other current health conditions. The history focuses on the respiratory, renal, or other conditions that could cause the acid–base problem. The standard questions for any history apply and are not repeated here. Other areas to explore in the history include the following: a recent history of vomiting or diarrhea (repeated vomiting causes metabolic alkalosis; prolonged diarrhea causes metabolic acidosis); use of heartburn or indigestion medications (a few days of baking soda/sodium bicarbonate ingestion can cause metabolic alkalosis); food insecurity; recent attempts to lose weight and methods employed (high-fat, low-carbohydrate diet or fasting predispose to starvation ketoacidosis); and use of medications, dietary supplements, recreational drugs, and alcohol.[26-29]

Examination Findings

Unless the acid–base imbalance is severe, specific signs and symptoms of disrupted acid–base balance often are overshadowed by the clinical manifestations of the underlying cause. For example, in a person who has type B COPD (chronic bronchitis), the dyspnea and excessive mucus production usually are more obvious than the mild drowsiness from partially compensated respiratory acidosis. With severe acute asthma, the chest tightness, coughing, wheezing, use of accessory respiratory muscles, and poor oxygenation typically overshadow the manifestations of acute respiratory acidosis.[1] People who have end-stage kidney disease experience many clinical manifestations from this chronic oliguric condition that predominate over lethargy from the metabolic acidosis that may occur between dialysis sessions, unless it becomes severe.[1]

With substantial rapid changes of pH, such as with ketoacidosis, dramatic changes in LOC can overshadow the signs and symptoms of the underlying condition. For example, a person who develops DKA typically will have been experiencing the polyuria, polydipsia, polyphagia, and weight loss of hyperglycemia before the onset of ketoacidosis. These manifestations often are realized only in retrospect, after abdominal pain and decreased LOC from the ketoacidosis have become the focus of attention and the metabolic acidosis is resolved.

Table 7.2 presents signs and symptoms of the various disruptions of acid–base balance. These manifestations arise from the impaired cellular and organ function described previously in this concept analysis. Decreased LOC occurs on a continuum from decreased attention span and drowsiness on one end to stupor and coma on the other. Interpretation of assessment findings may be complicated by the presence of fluid and electrolyte imbalances (see Concept 6, Fluid and Electrolytes).

Diagnostic Tests

Arterial blood gas measurement is the definitive diagnostic test for acid–base balance.[1,7,30] In some settings, venous blood gas values are used instead of arterial.[30-31] This section provides the conceptual basis for interpreting arterial blood gas results related to acid–base status. The commonly used values are pH, $PaCO_2$, HCO_3^- concentration, and base excess. The partial pressure of oxygen in arterial blood (PaO_2) and the saturation of oxygen in arterial blood (SaO_2), which are measures of oxygenation, are not discussed here.

pH

The pH is defined technically as the negative logarithm of the H^+ concentration. H^+ ions arise from dissociation of acids, both carbonic acid and metabolic acid. The H^+ concentration is very small and awkward to write[7]; for that reason, the pH is calculated. The pH scale ranges from 1 to 14, with a pH of 7 being neutral. Because pH is a negative logarithm, a low pH indicates a solution that is acidic (has a high H^+ concentration). A high pH indicates a solution that is alkaline (has a low H^+ concentration). The pH of the blood

TABLE 7.2 Clinical Manifestations of Disrupted Acid–Base Balance

	TOO MUCH ACID		TOO LITTLE ACID	
Type of Problem	**Too Much Carbonic Acid (Respiratory Acidosis)**	**Too Much Metabolic Acid (Metabolic Acidosis)**	**Too Little Carbonic Acid (Respiratory Alkalosis)**	**Too Little Metabolic Acid (Metabolic Alkalosis)**
Common clinical findings	Headache Decreased LOC Hypoventilation (cause of problem) Cardiac dysrhythmias If severe: hypotension	Decreased LOC Hyperventilation (compensatory mechanism) Abdominal pain Nausea and vomiting Cardiac dysrhythmias	Excitation and belligerence, lightheadedness, unusual behaviors; followed by decreased LOC if severe Perioral and digital paresthesias, carpopedal spasm, tetany Diaphoresis Hyperventilation (cause of problem) Cardiac dysrhythmias	Excitation followed by decreased LOC if severe Perioral and digital paresthesias, carpopedal spasm Hypoventilation (compensatory mechanism) Signs of volume depletion and hypokalemia if present
Blood gas findings	pH decreased (or low normal if fully compensated); $PaCO_2$ increased; HCO_3^- increased from compensation	pH decreased (or low normal if fully compensated); $PaCO_2$ decreased from compensation; HCO_3^- decreased	pH increased; $PaCO_2$ decreased; HCO_3^- decreased if compensation	pH increased; $PaCO_2$ increased from compensation; HCO_3^- increased

LOC, Level of consciousness.

has a normal range of 7.35 to 7.45 in adults, which is slightly alkaline. The normal range is lower in neonates and infants. In clinical settings, the term *acidemia* is used when the pH declines below the lower limit of normal (becomes *acidotic*). Even though the blood still may be slightly alkaline (>7.0), it is more acidic than the normal range. The term *alkalemia* denotes a blood pH that is above the normal range (becomes *alkalotic*).

$PaCO_2$

$PaCO_2$ is the partial pressure of CO_2 in the arterial blood. It indicates how well the lungs are excreting carbonic acid (CO_2 and H_2O).[10] The normal range of $PaCO_2$ is 35 to 45 mm Hg (4.7 to 6.0 kilopascals [kPa]) for adults (lower in infants). Increased $PaCO_2$ level indicates CO_2 accumulation in the blood (too much carbonic acid) caused by primary or compensatory hypoventilation; decreased $PaCO_2$ level indicates excessive CO_2 excretion (too little carbonic acid) caused by primary or compensatory hyperventilation.

HCO_3^- Concentration

The serum HCO_3^- concentration indicates how well the kidneys are excreting metabolic acid.[10] The normal adult range is 22 to 26 mEq/L (22 to 26 mmol/L); the range is lower in infants. Increased HCO_3^- concentration indicates that the blood has too little metabolic acid; decreased HCO_3^- concentration indicates that the blood has too much metabolic acid.

Base Excess

Base excess, which normally ranges from −2 to +2 mmol/L, is an indicator of how well the buffers are managing metabolic acid.[1] Values less than −2 mmol/L (negative base excess) indicate too much metabolic acid; values greater than +2 mmol/L indicate too little metabolic acid. When people develop metabolic acidosis, clinicians may calculate other values, such as the anion gap and the osmolal gap, to assist in diagnosing the specific cause.[3,17,32]

CORE COMPETENCIES

Acid–Base Balance

- Demonstrate clinical judgment founded on broad knowledge of acid–base balance.
- Using a person-centered approach, teach individuals and families regarding prevention and management of acid–base imbalances.
- Select, interpret, and act upon assessments related to acid–base balance.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient and family needs related to acid–base balance.
- Collaborate with the interprofessional team to provide patient safety and optimal management of acid–base imbalances.

CLINICAL MANAGEMENT

Clinical management of acid–base balance encompasses all clinical settings with primary and secondary prevention as well as interventions for people with acid–base imbalances.

Primary Prevention

The primary prevention for a disrupted acid–base balance focuses on prevention of the major risk factors previously discussed rather than on prevention of the disrupted acid–base balance itself. For example, prevention of respiratory diseases helps to prevent risk factors for accumulating too much carbonic acid. Thus, efforts to convince people not to begin smoking or to assist them to stop smoking, although targeted directly at the prevention of respiratory disease, also indirectly prevent respiratory acidosis. Similarly, careful diabetes

teaching and management, including attention to the social determinants of health, help prevent ketoacidosis as well as other potential complications of diabetes. Teaching people how to lose weight safely without totally eliminating carbohydrates can help prevent starvation ketoacidosis as well as to achieve weight management goals. Poison prevention efforts can help prevent excessive ingestion of acids or acid precursors. Instruction regarding hand hygiene and safe food storage helps prevent diarrhea and vomiting—two common risk factors for disrupted acid–base balance. In summary, many of the primary prevention strategies aimed at specific disease processes and behaviors detrimental to health in general also help prevent disrupted acid–base balance that can arise from these risk factors.

Secondary Prevention (Screening)

Screening measures to detect disrupted acid–base balance are not performed in the general population.

Collaborative Interventions

Patients experiencing acid–base imbalance require aggressive collaborative management aimed at treating the underlying condition. If left untreated or not treated effectively, acid–base imbalances can be fatal.[1,2]

Most medical and nursing management is directed at the disease process that disrupts the acid–base balance. In general, collaborative interventions to manage acid–base imbalances caused by an underlying respiratory condition include respiratory support. Likewise, collaborative interventions to manage acid–base imbalances caused by an underlying metabolic condition usually include fluid and electrolyte support.

Respiratory Support

People who have too much or too little carbonic acid usually receive some type of respiratory support, such as airway management and oxygen therapy. For example, with primary respiratory acidosis (too much carbonic acid), the focus of collaborative interventions is treatment of the disease process that is impairing alveolar ventilation. By treating the underlying cause of the disruption, acid–base balance may return to normal, or at least to a more stable state. People who are hyperventilating develop respiratory alkalosis (too little carbonic acid). Collaborative interventions for these people focus on treating the underlying factor (e.g., hypoxia, acute pain, or acute anxiety) that drives the hyperventilation. Hyperventilation that is a compensatory response to metabolic acidosis (too many metabolic acids) should be allowed to continue while the metabolic acidosis is treated.

Fluid and Electrolyte Support

People whose acid–base balance is disrupted by too much or too little metabolic acid usually receive fluid and electrolyte support as part of collaborative interventions to treat the underlying problem. For example, providing insulin and fluids to treat DKA removes the original problem and normalizes acid–base balance. Dialysis for a person who accumulates too much metabolic acid from oliguric renal disease treats multiple aspects of the condition, including the disrupted acid–base balance.[1]

Very low pH can be fatal; therefore, in situations of very severe metabolic acidosis in which pH is dangerously low, the collaborative focus occasionally expands to adjusting the pH itself. The most common agent used for pH adjustment is IV sodium bicarbonate, but its use is controversial.[33-35] The administration of IV sodium bicarbonate may cause extracellular fluid volume (ECV) excess or hypernatremia, may delay renal excretion of ketoacids, or may even lead to metabolic alkalosis from excessive administration. Monitoring for signs and symptoms of these complications, in addition to monitoring the patient's acid–base balance, is crucial.

Independent Nursing Interventions

Independent nursing interventions provide safety and comfort for people who have disrupted acid–base balance. Safety is high priority for patients with decreased LOC. In addition, interventions can promote compensatory mechanisms. For example, patients who are hyperventilating in compensation for metabolic acidosis need careful positioning to facilitate chest expansion and frequent oral care to prevent drying and cracking of their lips and the drying of oral mucous membranes. Another important type of intervention is teaching culturally appropriate ways to prevent disruptions of acid–base balance or when to seek help if they have chronic problems. Box 7.2 summarizes nursing interventions for people with disrupted acid–base balance.

BOX 7.2 Nursing Interventions For People With Disrupted Acid–Base Balance

- Ongoing assessment
- Implement safety measures
- Implement comfort measures
- Support compensatory mechanisms
- Implement collaborative interventions focused on:
  - Treatment of the underlying cause
  - Adjustment of the pH (controversial)
- Monitor for complications of therapy
- Patient teaching
  - Management of chronic underlying conditions
  - Recognition of early problems; when to seek help

INTERRELATED CONCEPTS

Numerous concepts discussed in this book have interrelationships with acid–base balance. For example, **Fluid and Electrolytes** and acid–base balance are closely related because changes in one of them can cause changes in the other. **Gas Exchange, Perfusion**, and **Nutrition** facilitate optimal acid–base balance by allowing normal acid production, whereas alterations such as ischemia, hypoxia, starvation, and high-fat, low-carbohydrate diets can disrupt that process. Similarly, **Elimination** facilitates optimal acid–base balance through acid

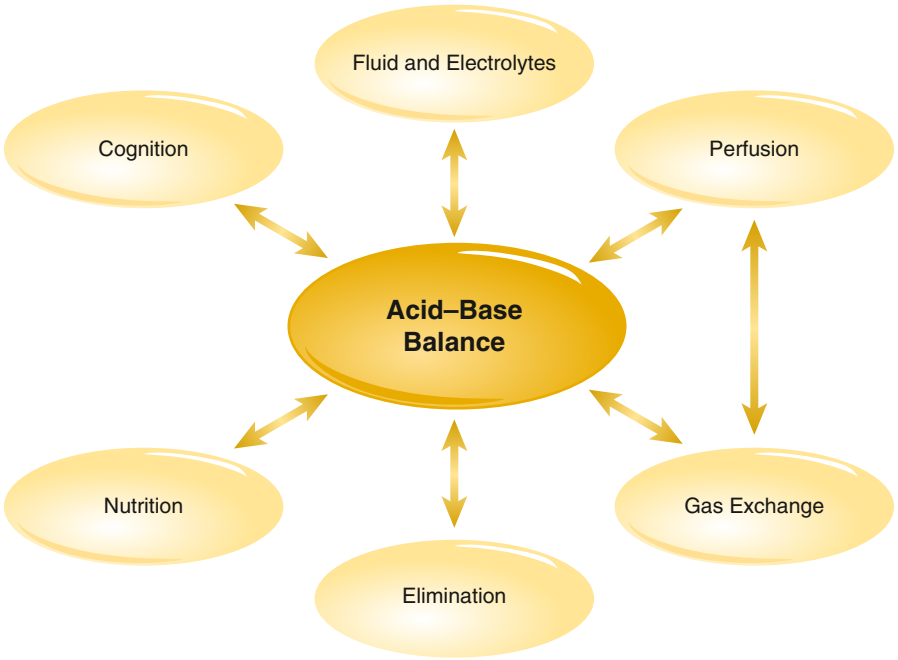

FIG. 7.4 Acid–Base Balance and Interrelated Concepts.

BOX 7.3 EXEMPLARS OF ACID–BASE IMBALANCE

Respiratory Acidosis
- Bacterial pneumonia
- Severe acute asthma
- Type B chronic obstructive pulmonary disease

Metabolic Acidosis
- Diabetic ketoacidosis
- Severe hypovolemia
- Circulatory shock
- Oliguric renal disease

Respiratory Alkalosis
- Hyperventilation from acute hypoxia
- Hyperventilation from acute pain
- Hyperventilation from acute anxiety

Metabolic Alkalosis
- Prolonged vomiting
- Mild hypovolemia
- Hypokalemia

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excretion; changes such as oliguria and diarrhea can disrupt acid–base balance. An individual who has a disrupted acid–base balance can experience altered **Cognition**. These interrelationships are illustrated in Fig. 7.4.

CLINICAL EXEMPLARS

An exemplar of optimal acid–base balance is a healthy person of any age. This person's acid production is balanced by acid excretion with adequate buffering. Optimal acid–base balance also can occur in a person with acute or chronic illness (e.g., osteoporosis) that does not seriously impair respiratory, gastrointestinal, endocrine, or renal function. The four exemplars representing acid–base disturbances are presented in Box 7.3 and are summarized briefly in the following Featured Exemplars section.

Featured Exemplars

Respiratory Acidosis

Respiratory acidosis is excess carbonic acid (measured as elevated $PaCO_2$) in the blood. Cellular metabolism continually produces carbonic acid, which must be excreted by the lungs or it accumulates in the blood. People with high risk of primary respiratory acidosis have acute or chronic respiratory diseases or other conditions that interfere with alveolar ventilation. These conditions arise from problems in the alveoli or airways (e.g., type B COPD and severe acute asthma), problems with respiratory muscle function (e.g., Guillain–Barré syndrome), or problems with the brainstem control of respirations (e.g., overdose of opioids or other central nervous system depressants). People develop mild compensatory respiratory acidosis if they have primary metabolic alkalosis.[4]

Respiratory Alkalosis

Respiratory alkalosis is too little carbonic acid (measured as decreased $PaCO_2$) in the blood. People at high risk for primary respiratory alkalosis are hyperventilating, which excretes carbonic acid faster than it is produced by cellular metabolism. Common causes of hyperventilation are acute hypoxia, acute pain, and emotional distress.[19-21] People develop compensatory respiratory alkalosis if they have primary metabolic acidosis.

Metabolic Acidosis

Metabolic acidosis is excess metabolic acid (measured as decreased HCO_3^-) in the blood. Cellular metabolism continually produces metabolic acid, which must be buffered in the blood by the HCO_3^- buffer system and excreted by the kidneys or the acid will accumulate in the blood. People with high risk of primary metabolic acidosis have excessive production or intake

of metabolic acid (e.g., ketoacidosis or boric acid ingestion), decreased renal excretion (e.g., acute or chronic oliguria), or lose HCO_3^- buffers from the body (e.g., prolonged diarrhea).[13] These high-risk people include those with undiagnosed or inadequately treated type 1 diabetes, chronic alcohol use disorder with malnutrition, untreated hyperthyroidism, circulatory shock, acute kidney injury, and oliguric chronic kidney disease.[9–13,29] In addition, people who have large rapid infusion of IV isotonic saline may develop metabolic acidosis, partly because their bicarbonate levels are decreased by dilution.[35] People develop compensatory metabolic acidosis if they have a primary respiratory alkalosis that lasts for at least several days.

Metabolic Alkalosis

Metabolic acidosis is too little metabolic acid (measured as increased HCO_3^-) in the blood. People at high risk of primary metabolic alkalosis most frequently have excessive intake of HCO_3^- through the use of baking soda as antacid, receiving IV $NaHCO_3$, or from metabolizing the citrate in massive blood transfusions.[1] Mild metabolic alkalosis is common with diuretic therapy.[8] People who have prolonged vomiting excrete metabolic acid more rapidly than it is produced while also retaining HCO_3^- renally.[1,7] People develop compensatory metabolic alkalosis if they have a primary respiratory acidosis that lasts for at least several days.

CASE STUDY

From samer chand/iStock/Thinkstock.

Case Presentation

Kevin Harney, age 14 years, did not appear for breakfast when his mother called him. "That is unusual," she thought, "He has been so hungry lately, and he is so skinny; he really needs the food!" She found Kevin lying on his bed, breathing rapidly and deeply. He responded slowly with one or two words at a time to her increasingly frantic questions. Some of his answers did not make sense. Kevin's parents took him to the nearest emergency department, where his laboratory tests showed arterial blood pH 7.20, $PaCO_2$ 21 mm Hg (2.8 kPa), serum HCO_3^- concentration 8 mEq/L (8 mmol/L), and glucose concentration 450 mg/dL (25 mmol/L). Kevin was diagnosed with DKA arising from previously undiagnosed type 1 diabetes. During Kevin's hospitalization, interventions focused initially on intensive collaborative management of his disrupted acid–base balance with insulin and IV fluid to treat the diabetes. As a safety intervention, Kevin was positioned on his side to prevent aspiration if he vomited. During this phase of management, attention also was given to supporting his parents, explaining that Kevin's unusual breathing pattern actually was beneficial to him and coaching his mother to assume the task of protecting Kevin's lips by keeping them lubricated. Careful monitoring of blood values and physical assessment parameters was used to follow his progress and to modify therapy when his condition changed. As Kevin began to be more responsive and stable, the focus of nursing interventions expanded to teaching Kevin and his parents about type 1 diabetes: how to manage it and how to recognize the signs of hyperglycemia. Although not directed specifically at the acid–base balance, this teaching helped to prevent future episodes of DKA through disease management.

Case Analysis Questions

1. Review Fig. 7.1. Based on the information presented in the case, where does Kevin fall on the continuum?
2. Review Box 7.1, examining the three categories that can cause metabolic acidosis. In which category does Kevin's situation definitely fall? Explain the mechanisms by which this occurs in undiagnosed type 1 diabetes. Is there an additional category that also may have played a part?
3. Explain the mechanisms that caused Kevin's decreased $PaCO_2$ and decreased HCO_3^- concentration.

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CONCEPT 8

Thermoregulation

L. Jane Rosati and Amy Szoka

The human body has the capability of regulating body temperature at a near constant value, a process known as thermoregulation. Temperature regulation is critical for optimal physiologic function. Thermoregulation is a foundational nursing concept; thus, it is essential that nurses apply this concept in nursing practice.

DEFINITION

Optimal physiologic function of the human body occurs when a near-constant core temperature is maintained. Normal body temperature ranges from 36.2°C to 37.6°C (97.0°F to 100°F), or an average of 37°C (98.6°F).[1] Fluctuation outside this range is an indication of a disease process, strenuous or unusual activity, or extreme environmental exposure. Thermoregulation is defined as *the process of maintaining core body temperature at a near constant value.*[1] The term *normothermia* refers to the state in which body temperature is within the "normal" range. The term *hypothermia* refers to a body temperature below normal range (<36.2°C; 97.0°F), and *hyperthermia* refers to a body temperature above normal range (>37.6°C; 100°F). An extremely high body temperature is referred to as *hyperpyrexia.*

SCOPE

Thermoregulation is an aspect of homeostasis that balances heat gain and heat loss. The known circadian variation of body temperature usually has an amplitude of 0.8°C to 1.0°C. It is regulated by a circadian variation in the hypothalamic "set point." Body temperature in the middle of a person's usual sleeping time will normally be lower, then begins to rise with their normal waking time, and peaks again late in their usual activity period, decreasing again around the person's usual bedtime. Body temperatures can range from above normal to below normal; thus, the scope of this concept is considered in this way (Fig. 8.1). Physiologic adjustments to body temperature are controlled by the hypothalamus—often considered the thermostat center of the body. The nurse uses the average target temperature of 37°C (98.6°F) to assess this state.

NORMAL PHYSIOLOGICAL PROCESS

Thermoregulation occurs through a complex, yet precise physiologic process controlled by the hypothalamus that balances heat production, heat conservation, and heat loss. The hypothalamus establishes a "set point"—meaning the temperature range for optimal physiologic functioning. The average hypothalamic set point for core body temperature is 37°C (98.6°F), although variations in temperature occur in different parts of the body. The core temperature is about 0.5°C (0.9°F) higher than skin surface temperature. Temperature variations also occur in response to physical activity environmental temperatures, and circadian rhythm. Despite these variations, compensatory and regulatory actions maintain a steady body temperature range, representing a critical function necessary for life. A basic review of temperature control, heat production, heat conservation, and heat loss are foundational to an understanding of thermoregulation.

Temperature Control

Temperature control is mediated by the hypothalamus through neural and hormonal control. The hypothalamus is located below the thalamus in an area of the brain called the diencephalon. This is a small but important area of the brain located between the midbrain and the cerebrum (Fig. 8.2).

Thermoregulation involves a negative feedback system, which reverses or opposes a change in a controlled condition.[3] Multiple thermoreceptors are located throughout the body. Peripheral thermoreceptors (located in the skin) and central thermoreceptors (located in the spinal cord, abdominal organs, and hypothalamus) provide skin and core temperature information to the hypothalamus. The hypothalamus activates a series of responses to lower or raise body temperature based on information received by the thermoreceptors.

When the thermoreceptors signal a lowering of body temperature, the hypothalamus initiates a series of heat-producing and heat-conserving mechanisms through endocrine and sympathetic nervous system connections. Thyrotropin (or thyroxine)-stimulating hormone–releasing hormone (TSH-RH) is secreted by the hypothalamus, which in turn stimulates

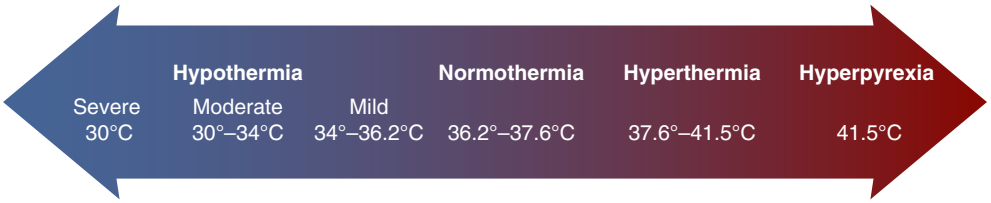

FIG. 8.1 Scope of Thermoregulation Ranges. From Hypothermia to Normothermia to Hyperthermia.

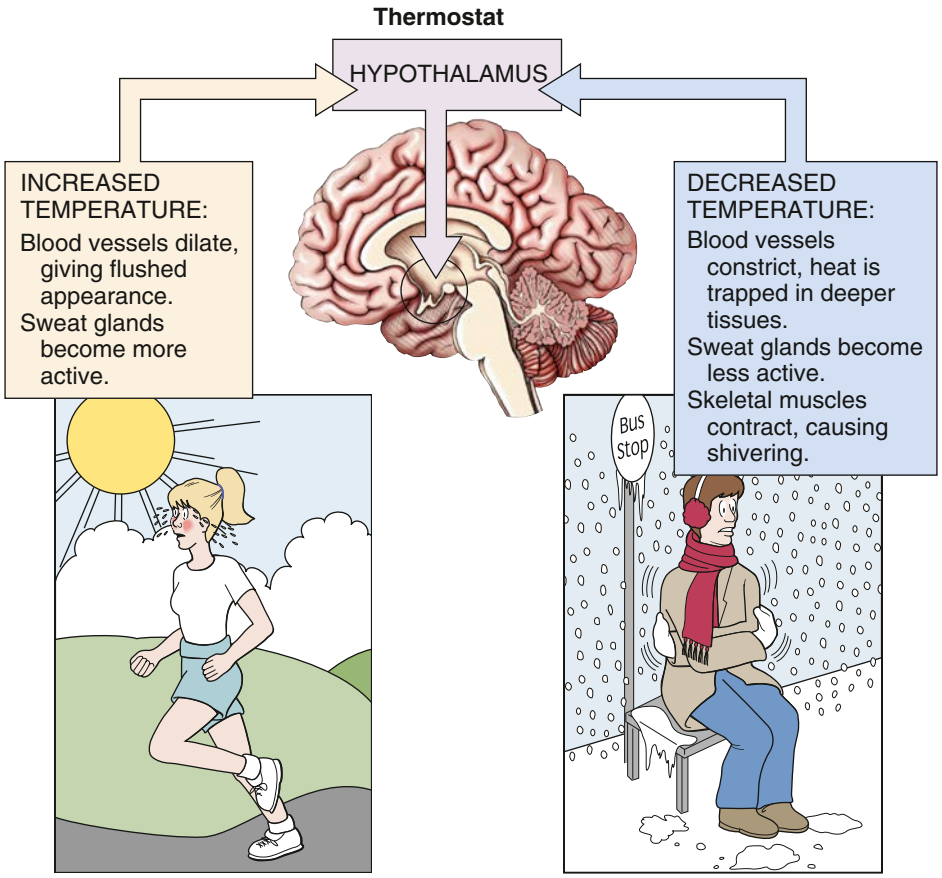

FIG. 8.2 Temperature Regulation. The hypothalamus controls body temperature and signals for mechanisms to increase heat production or facilitate heat loss. (From Herlihy, B. [2014]. *The human body in health and illness* [5th ed.]. St Louis: Elsevier.)

the anterior pituitary to release thyroid-stimulating hormone (TSH). TSH acts on the thyroid gland to release thyroxine (T_4), which activates the adrenal medulla to cause the release of epinephrine into the blood. Epinephrine increases heat production by increasing the metabolic rate, stimulating glycolysis, and causing vasoconstriction (see Fig. 8.2). The hypothalamus also stimulates the sympathetic nervous system, which triggers the adrenal cortex to increase muscle tone and initiate a shivering and vasoconstriction response.

When the thermoreceptors signal an increase in body temperature, the same mechanisms are reversed (the classic feature of a negative feedback system). The release of TSH-RH is discontinued (thus stopping the T_4 and epinephrine responses), and the sympathetic nervous system is signaled to induce vasodilation, decrease muscle tone, and initiate sweat production (see Fig. 8.2). Sweat glands rapidly produce and release increased levels of perspiration; heat dissipates from the body as sweat evaporates from its surface.

Heat Production

Body heat is continually produced through three primary mechanisms: (1) chemical reactions associated with metabolic activity, (2) skeletal muscle contraction, and (3) chemical thermogenesis.

Chemical Reactions and Metabolic Activity

The ingestion and metabolism of food and basal metabolic activity occur through chemical reactions that require energy and produce heat. These actions are primarily responsible for the maintenance of core body temperature.

Skeletal Muscle Contraction

Skeletal muscle contraction represents an important mechanism for heat production. When muscles are used for any action, heat is produced. Muscle contraction produces heat through muscle tone and shivering (rapid muscle oscillations). Muscle contractions are controlled by the hypothalamus and occur when

peripheral thermoreceptors signal a drop in temperature. Thus, as peripheral temperature drops, there is an increase in muscle tone; further drops in temperature triggers shivering.

Chemical Thermogenesis

Chemical thermogenesis (sometimes referred to as nonshivering thermogenesis) results from the release of epinephrine and norepinephrine which creates a rapid, temporary increase in heat production through an increase in the basal metabolic rate. This process primarily occurs through metabolism in brown and beige adipose tissue, which is rich with mitochondria and blood vessels. The hormone thyroxine also triggers an increase in basal metabolic rate, but in contrast, this mechanism is a slow, prolonged rise.

Heat Conservation

Heat conservation represents another mechanism of thermoregulation. Heat conservation occurs through vasocontraction of peripheral blood vessels. This process shunts centrally warmed blood away from the peripheral tissues to reduce heat loss from radiation, conduction, and convection (explained in the following section) to the body's core for heat retention. Skin and subcutaneous fat serve as insulation and provide additional heat conservation properties.

Heat conservation also occurs through intentional actions such as wearing additional clothes, covering up with a blanket, and curling up in a ball. Clothing and a blanket provide additional insulation and warmth, whereas curling up reduces skin exposure for heat loss and retains heat through skin-to-skin contact.

Heat Loss

Not only does the body continually produce heat through metabolic activity but also it continuously loses heat. Heat loss occurs through multiple mechanisms, including radiation, conduction, convection, vasodilation, evaporation, reduced muscle activity, and increased respiration.

Heat loss to *radiation* occurs through a process of electromagnetic waves that emit heat from skin surfaces to the air. The degree of heat loss through radiation is directly related to the difference between ambient air temperature, skin temperature, and exposure. *Conduction* is a transfer of heat through direct contact of one surface to another; warmer surfaces lose heat to cooler surfaces. A loss of heat by air currents (caused by wind or a fan) moving across the body surface is referred to as *convection.*[2] Warmer air at the body surface is replaced by the cooler air, resulting in cooling of the skin surface. Wet skin or clothing accelerates this process.

Heat loss can be increased through peripheral *vasodilation,* which brings a greater volume of blood to the body surface. Increased heat loss occurs by conduction (explained previously). However, this process is not effective if ambient air temperature is greater than body temperature. A reduction in muscle tone and muscle activity occurs as another mechanism to minimize heat production. This process explains the fatigue or "washed out" feeling experienced in hot weather or after sitting in a hot tub for a period of time.[3]

Evaporation is yet another mechanism involved with heat loss. Perspiration causes moisture to accumulate on the skin which evaporates from the skin surface. This process provides a significant source of heat reduction and normally accounts for 600 mL of water loss per day. In extreme heat, an individual can lose as much as 4 L of fluids in an hour; for this reason, replacement of fluids and electrolytes is essential to prevent dehydration. Heat is also lost during the process of respiration. Cool ambient air is inhaled and warmed in the respiratory tract and by the microcirculation within the alveoli. The warmed air is then exhaled. For this reason, elevated respiratory rates are seen among individuals with elevated temperature, and lower respiratory rates are seen in individuals with hypothermia.

Age-Related Differences

Ineffective thermoregulation occurs at both ends of the age spectrum.

Infants

Several important physiologic differences among infants exist related to thermoregulation. Newborns do not have heat-conserving capacity; thus, thermoregulation is linked closely with metabolism and oxygen consumption. The newborn infant has a unique source of heat from brown adipose tissue (or brown fat). This tissue is associated with intensified metabolic activity, thus creating greater heat production capacity compared with normal adipose tissue. Brown fat provides an important mechanism for heat production. Because newborn infants generally do not shiver, a process referred to as *nonshivering thermogenesis* (described previously) involves a rapid increase in metabolism and oxygen consumption and helps to offset heat loss.[4] Although newborn infants produce sufficient body heat, they have a propensity for heat loss due to a greater body surface area to weight ratio. The flexed posture of newborns moderates heat loss somewhat by reducing surface area exposure. Another physiologic difference leading to newborn heat loss is limited insulation due to a thin layer of subcutaneous fat. Blood vessels are closer to the skin, further contributing to heat loss tendencies.

Thermoregulation becomes more efficient as the infant becomes older. Advanced physiologic responses to temperature variations emerge that include the ability of muscles to contract, shivering response, vasoconstriction, and vasodilation, and increased adipose tissue.

Older Adults

Several physiologic changes associated with aging affect thermoregulation among older adults. Slower circulation, including decreased vasoconstrictor responses, reduced function of thermoregulatory capacity of the skin (including decreased or absent sweating), and reduced heat production (associated with slower metabolic and physical activity), decreased shivering response, and reduced perception of environmental temperature, are seen among older adults.[3]

VARIATIONS AND CONTEXT

Variations in body temperature are represented by higher or lower body temperature from normal and are classified into three major categories: fever, hyperthermia, and hypothermia.

Fever

Fever represents a complex pathophysiological reaction involving the immune system in response to *pyrogens* (fever-producing

agents) that trigger the hypothalamus in the brain to adjust heat production, heat conservation, and heat loss mechanisms to maintain a higher core temperature, representing an increased hypothalamic set point. (Recall that *set point* is the established value determined by the hypothalamus for optimal physiologic function.) There are two kinds of pyrogens. *Exogenous pyrogens* (those of external origin) include bacterial endotoxins, viruses, antigen–antibody complexes, etc. *Endogenous pyrogens* are produced by phagocytic white blood cells as part of the immune response and include interleukin-1, interleukin-6, tumor necrosis factor, and interferon. When exogenous pyrogens invade the body, endogenous pyrogens are released that trigger the production of prostaglandin E_2, which in turn elevates the thermal set point and increases core body temperature.[2]

Hyperthermia

Although elevated body temperature occurs in both hyperthermia and fever, the underlying processes are quite different. Hyperthermia occurs when the body temperature rises above 37.6°C with an unchanged hypothalamic set point. The three physiologic mechanisms that coordinate body temperature are also the three mechanisms that can lead to hyperthermia: excessive heat production, inadequate ability to cool, or hypothalamic regulator dysfunction. When heat-related conditions occur, the body's natural ability to dissipate heat is interrupted, resulting in an increase in body temperature that exceeds heat loss. This can occur as a result of several factors, including environment (temperature, humidity, and lack of air movement), excessive physical exertion (particularly in hot, humid environments without sufficient water replacement), genetic abnormality, metabolic diseases, injury to the hypothalamus, and as a result of pharmacologic agents.

Hypothermia

Hypothermia occurs when the core body temperature declines below 36.2°C and is further classified as mild (34°C to 36°C or 93.2°F to 96.8°F), moderate (30°C to 34°C or 86°F to 93°F), or severe (<30°C or <86°F). Three physiologic factors can lead to hypothermia: excessive heat loss, insufficient production of heat, or dysfunction of hypothalamic regulatory mechanisms. Hypothermia may be either accidental or therapeutic. Accidental hypothermia results from environmental exposure (including staying out in the cold too long, wearing insufficient clothing for weather conditions, wet clothing, and cold-water submersion) or as a complication from serious systemic disorders. Therapeutic hypothermia—also referred to as targeted temperature management—is intentionally induced to reduce metabolism and thereby preserve tissue by preventing tissue ischemia such as after a cardiac arrest. Therapeutic hypothermia counteracts the overstimulation of the neuro cells thereby stabilizing calcium and glutamate release reducing cell death.

CONSEQUENCES

Although the body tolerates some variation in body temperature, physiologic consequences can occur because of elevated or lowered temperature. The two variables that affect the extent of consequences for hypothermia and hypothermia are (1) the extent of temperature change and (2) the duration of temperature variation.

Consequences of Elevated Body Temperature

A significant increase in body temperature leads to many physiologic changes that can be fatal due to cardiovascular collapse and damage to the nervous system. Mentioned previously, one compensatory response to elevation in body temperature is sweating—a measure that helps to cool the body. Excessive and prolonged sweating coupled with a sustained high body temperature can result in sodium loss and dehydration if fluid replacement does not occur. Over time, excessive body temperature can lead to hypotension, tachycardia, and decreased cardiac output, progressing to reduced perfusion and coagulation within the microcirculation and cardiovascular collapse. Sustained high core body temperature coupled with reduced perfusion leads to cerebral edema, central nervous system degeneration, and renal necrosis.

Consequences of Hypothermia

The physiologic consequences of hypothermia are dependent on the severity and duration of exposure. As core body temperature decreases, compensatory mechanisms including shivering (muscle contraction to simulate warmth) and vasoconstriction (to reduce heat loss) occur. However, because prolonged vasoconstriction would lead to peripheral tissue ischemia, intermittent reperfusion of peripheral tissues occurs. Prolonged hypothermia eventually leads to reduced perfusion in the microcirculation attributable to increased viscosity of the blood and reduced blood flow and coagulation. Also, the vasoconstrictive efforts controlled by the hypothalamus eventually fail, causing vasodilation and, thus, accelerating the loss of body heat. Individuals experiencing significant hypothermia have been known to remove clothing because of reduced cognition and because the vasodilation can create a false warming sensation.

RISK FACTORS

Risk factors can be described in terms of both populations at risk and individual risk factors. Recognition of risk factors is essential so that appropriate preventive measures can be initiated. Risk factors that affect thermoregulation include age, environment, and physiologic condition of the individual.

Populations at Risk

Although all humans are at risk for alterations in thermoregulation, certain population groups have significantly greater risk—particularly the very young and the very old. Infants and older adults have less efficient physiologic mechanism for heat production and conservation. Recognizing the variances and consequences in these vulnerable populations is essential to nursing care across the lifespan.

Infants and Young Children

Infants (particularly premature infants) have undeveloped temperature regulation capacity. Infants usually produce sufficient body heat, but they lack the ability to conserve heat produced; a large surface area relative to body mass makes them susceptible to excessive temperature loss.[4] Infants and young children are also at risk because they are unable to independently take measures to correct changes in temperature. They are completely

dependent on the appropriate actions of caregivers for maintenance of a normothermic temperature range. One of the most visible examples is when infants and young children are trapped inside vehicles, resulting in heat-related deaths.[5]

Older Adults

The elderly experience fluctuations in temperature because of a diminished ability to regulate body temperature due to a less effective thermoregulatory response (described previously).[2] The elderly also have a reduced perception of heat and cold; thus, they may not recognize when to take appropriate action in a timely manner. Elderly who lack resources to stay warm or cool in temperature extremes are also at risk for thermoregulation. According to the Centers for Disease Control and Prevention (CDC), heat- and cold-related deaths drastically rise among adults older than age 75 years.[6]

Other Population Groups

The risk for heat- and cold-related deaths is twice as high for non-Hispanic black males. Black males have higher rates of heat-related and cold-related deaths than any other race and ethnic group. The CDC reported that non-Hispanic Blacks had a heat-related mortality rate 2.5 times that of non-Hispanic Whites; likewise, non-Hispanic Blacks had a cold-related mortality rate 2.0 times that of non-Hispanic Whites.[6] People of low socioeconomic status may lack resources for adequate clothing, heating, and cooling. The homeless population (because of their frequent exposure to the elements and lack of adequate shelter) is particularly at high risk for hyperthermia or hypothermia. Populations living in certain geographic areas in the United States that have hot or cold climates are also at increased risk. Most heat-related deaths occur in the southern and western states; western states also have the highest cold-related death rates.[6]

Individual Risk Factors

Impaired Cognition

Individuals with impairments in cognition (either acute or chronic) are at risk for imbalanced temperature because of the potential inability to recognize dangerous environmental exposures or the inability to react appropriately. Persons under the influence of drugs or alcohol are at risk because sensory alterations affect judgment or there may be a loss of consciousness, thus increasing the risk for environmental exposure. Because alcohol acts as a vasodilator (dilation of surface blood vessels lead to loss of body heat), it is a common underlying factor in hypothermic deaths.[6]

Underlying Health Conditions

Several heath conditions are associated with altered thermoregulation (Box 8.1). Individuals with preexisting medical conditions (e.g., congestive heart failure, diabetes, or gait disturbance) are at increased risk for hypothermia because their bodies have a reduced ability to generate heat. Individuals who undergo surgical procedures are also at risk for hypothermia, particularly if the procedure is long as patients may not have adequate covering to conserve heat loss.[7,8] Individuals who have experienced traumatic brain injury are at risk for problems with thermoregulation, particularly if the area of the brain damaged leads to hypothalamic dysfunction.[1]

Several health conditions (infections, autoimmune disorders, trauma, and thyroid disturbances) place individuals at risk for elevated body temperature. Dehydration also may be associated with elevated body temperature because of the need for fluids to cool the body. Some medications, both prescribed and over-the-counter, may affect thermoregulation. Therefore, a complete medication list is needed to further assess risk.

BOX 8.1 Health Conditions as Risk Factors For Altered Thermoregulation

- Autoimmune conditions
- Burns
- Chronic conditions
- Hypothalamic injury
  - Traumatic brain injury
  - Stroke
  - Brain neoplasm
- Infection
- Inflammation
- Long surgical procedures
- Metabolic conditions
  - Hyperthyroidism
  - Hypothyroidism
- Prematurity/preterm birth
- Protein calorie malnutrition
- Traumatic injury

Genetics

A less common risk factor for impaired thermoregulation is genetic predisposition. The classic example of this is malignant hyperthermia (MH), a condition associated with an inherited autosomal dominant pattern. Malignant hyperthermia is often considered a surgical complication because it is actually a biochemical chain reaction triggered by commonly used general anesthetics and succinylcholine.

Recreational or Occupational Exposures

Individuals may suffer impairments in thermoregulation while participating in recreational activities or working in conditions associated with temperature extremes. Strenuous activity in high ambient temperatures, particularly with high humidity, can lead to hyperthermia. Winter recreational activities, such as hiking, snowmobiling, and skiing, can lead to hypothermia if an individual has inadequate clothing for the activity or if the individual becomes lost or injured. Cold water exposure also quickly leads to hypothermia, particularly if the air temperature is also cold.[9]

ASSESSMENT

Body temperature is included in nearly all assessments because this provides baseline information about homeostasis and general health. When problems associated with thermoregulation present, a history and examination are warranted. Assessment begins with the outward appearance of patient, noting sweating and/or shivering, color of skin, and touching the skin for temperature of skin.

History

Typically, a history does not include specific questions related to normal body temperature or thermoregulation. However, in the event of thermoregulation imbalance, a history provides

valuable information needed to understand the problem. The age, health history, family history (for malignant hyperthermia), and social history provide necessary information to establish risk factors. Additional questions include the presence of recent injury, illnesses, or environmental exposure. If there has been recent environmental exposure, the type, severity, and length of exposure should be determined.

Symptoms associated with hyperthermia vary depending on the degree of elevated temperature and underlying conditions. Reported symptoms may include "feeling feverish" or "feeling hot," chills, general malaise, lethargy, weakness, dizziness, loss of appetite, or muscle cramps. The primary symptom most associated with hypothermia is feeling cold.

Examination Findings

Vital Signs

Nursing assessment begins with measuring vital signs. Body temperature can affect all vital signs. Therefore, the assessment findings must be considered as a whole, with attention given to the accuracy of the measurement method. The most common routes to measure temperature include oral, rectal, auxiliary, temporal artery, and tympanic.

Core body temperature reflects the temperature of the body's internal organs. The temperature normally ranges from 97.7°F to 101.3°F (36.5°C to 38.5°C). If core body temperature must be measured, the most reliable temperature is gained from a pulmonary artery catheter.[1] However, due to its invasiveness, this approach is used only in critical care settings. Outside of the critical care area, the most common way to measure core body temperature is the rectal route. A lubricated probe is inserted into the rectal canal at a depth of 1 to 1.5 inches in the adult and 0.5 to 1 inch in the child. Other core temperature sites include the esophagus and urinary bladder.[11] Temperature measurement among infants and children can be accomplished with a tympanic thermometer, an oral thermometer (a pacifier thermometer), or via an axillary or temporal artery, although the temporal artery method may not be as reliable in children younger than 2 years. In addition to vital signs, the nurse will assess for other clinical findings associated with altered body temperature.[10]

Elevated Body Temperature

Although the general appearance of an individual experiencing hyperthermia varies (depending on the underlying cause and the degree of temperature elevation), several common clinical findings are observed. Vasodilation occurs, causing the skin to appear flushed and warm or hot to touch. If the sweat mechanism has been activated, the individual will be diaphoretic, although this finding may be absent. Patients will often present with dry skin and mucous membranes, decreased urinary output, and other signs of dehydration and electrolyte imbalance. Because of the effects of high body temperature on the brain and central nervous system, seizures may occur, and the patient's cognitive status may range from slightly confused or delirious to coma.

Hypothermia

The clinical presentation of hypothermic patients also varies, depending on the severity of the condition. Peripheral vasoconstriction causes the skin to feel cool and have slow capillary refill; skin color is pale and becomes cyanotic. Muscle rigidity and shivering is often observed (as a compensatory response to generate heat) although the shivering response diminishes or ceases when the core temperature decreases to 86.0°F (30°C). Prolonged vasoconstriction affects the delivery of oxygen to cells, which will result in cognitive changes.[10] A person may experience poor coordination and sluggish thought processes at 93.2°F (34°C); this progresses to confusion and eventually stupor and coma by the time the temperature decreases to 86.0°F (30°C). Dysrhythmias (e.g., atrial and ventricular fibrillation) may occur due to myocardial irritability. As hypothermia progresses, the metabolic rate declines and perfusion of blood is significantly reduced, leading to diminished urinary function, coma, and cardiovascular collapse.

CORE COMPETENCIES

Thermoregulation

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to thermoregulation.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to thermoregulation.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to thermoregulation.
- Using a person-centered approach, educate individuals and families regarding health promotion strategies to minimize problems associated with thermoregulation.
- Demonstrate clinical judgment founded on broad knowledge of thermoregulation.

CLINICAL MANAGEMENT

Primary Prevention

Most cases of hyperthermia and hypothermia are preventable by reducing risk. Primary prevention measures include environmental control and shelter, appropriate clothing for different conditions, and level of physical activity. The nurse's role in primary prevention is through patient education.

Environmental Control and Shelter

Maintaining optimal ambient temperature in the home or having adequate shelter during temperature extremes is essential. If a home does not have air conditioning in the summer months, opening windows and using fans are encouraged. If home heating is inadequate during cold weather, patients should be advised to wear adequate and/or additional clothing and use blankets for additional warmth. Wind drafts should be blocked, and curtains hung at windows to improve insulation.

Community resources, including homeless shelters, can be used to assist those who are unable to stay cool during warm months and warm during the cold months. Individuals also can be encouraged to go to public buildings, such as indoor shopping malls or libraries, where ambient temperatures are usually adequately regulated. For those exposed to the elements, seeking adequate shelter can be lifesaving. Shelter includes finding shade and ideally a breeze when temperatures are high and avoiding the wind and precipitation when temperatures are low.

Appropriate Clothing

The selection of appropriate clothing is another primary prevention strategy. Although this applies to both types of temperature extremes, adequate clothing is essential to prevent hypothermia with cold temperatures. Evaporative heat loss is five times greater when clothing is wet; thus, dry clothing is essential. A newborn is susceptible to rapid heat loss directly after birth, and hypothermia may result. Immediately after delivery, the infant should be dried quickly, wrapped in blankets, and moved to a heated environment. Care should be taken to limit the time the infant's skin is wet (e.g., bathing, wet diapers, or clothing).

The infant should be dressed in layers and the head covered for warmth. New parents should be instructed about heat loss in newborns and young children; dressing the infant and child appropriately for the weather and adequate regulation of temperature in the home are essential. When the environmental temperature is low, infants should be provided with a hat to guard against heat loss, just as the elderly patient may need a sweater or clothing with long sleeves for comfort. The elderly (or their caregivers) may need to be reminded to dress in clothing appropriate for the weather.

Physical Activity

Physical activity increases body temperature. Increasing physical activity helps to warm the body when exposed to low temperatures and can prevent hypothermia. Physical exertion in hot conditions increases the risk for hyperthermia because the heat gains may exceed heat loss. Resting, maintaining adequate hydration, wearing appropriate clothing, and seeking shelter will help reduce risk under such conditions.

Secondary Prevention (Screening)

The goal of secondary prevention refers to the detection of a disease or condition. The only screening mechanism that applies to the concept of thermoregulation is screening for malignant hyperthermia. Because susceptibility to malignant hyperthermia is inherited (autosomal dominant disorder), genetic screening is available and recommended for individuals who have relatives with genetic mutations.

Collaborative Interventions

Management of the patient with altered thermoregulation is dependent on the core body temperature and the overall physical condition of the individual. Generally, infants and young children, the elderly, and individuals in poor health not only have greater risk factors but also have less physical capacity for physiologic compensation when changes in core body temperature occur.

Elevated Body Temperature

The underlying cause of the elevated body temperature should be identified (e.g., a fever associated with an inflammatory process or hyperthermia associated with exposure). Regardless of the cause, the goal is to minimize cardiovascular and neurologic complications associated with excessive body temperature. Care of the individual whose temperature has exceeded 37°C should include removal of excess blanketing and clothing while observing for continued signs of hyperthermia (increased respiration, increased or decreased perspiration, high fever, and seizures). Signs and symptoms that persist beyond 1 hour require further intervention. Hydration, nutritional support, and other palliative measures to reduce core temperature should be implemented. Cool packs may be placed in the axillary and groin areas; a cooling blanket or lukewarm bath may also facilitate temperature reduction. Care should be taken not to induce shivering. More aggressive cooling efforts include gastric or colonic lavage with cool fluids.

The presence of fever is considered an expected finding with a systemic inflammatory response. Mild to moderate fever generally does little harm and may actually have beneficial effects to counteract the inflammation. However, complications such as dehydration and increased metabolic demand can occur.[13] Symptomatic relief of persistent or intermittent fevers can be treated with antipyretics such as nonsteroidal antiinflammatory drugs (e.g., naproxen or ibuprofen and aspirin) and acetaminophen. Aspirin is also useful for reducing fever but should be used with caution; aspirin is not recommended for children because of the risk of Reye syndrome. The use of a drug called dantrolene sodium can reverse the effects of malignant hyperthermia. Intracellular calcium levels are elevated in malignant hyperthermia; dantrolene counteracts this abnormality by reducing muscle tone and metabolism. Administration of dantrolene intravenously has dramatically reduced the mortality rate of malignant hyperthermia.[14]

Hypothermia

The goal of managing hypothermic patients is to increase the body temperature to the normal range. An initial step is to remove the individual from the cold. If hypothermia is mild, passive and active external rewarming measures are indicated. Passive measures include dry and warm clothing, warm drinks, and exercise, and these may be enough. However, active rewarming measures may be necessary and include providing warm blankets or heating pads, drawing a warm water bath, and placing the patient in a heated environment. The use of heated intravenous fluid helps with hypothermia if the patient is receiving more than 500 mL.

CLINICAL NURSING SKILLS FOR THERMOREGULATION

- Assessment
- Monitoring vital signs
  - Temperature measurement
  - Heart rate
  - Respiratory rate
  - Blood pressure
- External warming devices
  - Warm blankets
  - Administer warm oral fluids
- Active core warming
  - Warm intravenous fluids
  - Heated humidified oxygen
  - Warm fluid lavage
- Cooling measures
  - Cool water bath
  - Cool intravenous fluids
  - Cool fluid lavage
  - Cooling blankets

When core body temperature falls below 35°C, active core rewarming measures are indicated, which means there is an application of heat directly to the core. Core rewarming should be done slowly and carefully to minimize the risk of triggering dysrhythmias; thus, continuous cardiac monitoring and core body temperature observation are necessary. Active core rewarming strategies include infusion of warm intravenous solutions, gastric lavage with warm fluid, peritoneal lavage with warm fluid, and inhalation of warmed oxygen. In cases of accidental hypothermia with cardiac deterioration, extracorporeal membrane oxygen may be indicated.[15–16]

INTERRELATED CONCEPTS

Many concepts are clearly interrelated to thermoregulation. Those that have greatest importance are presented in Fig. 8.3.

Infection is defined as *the invasion and multiplication of microorganisms in body tissues, which may be clinically unapparent or may result in local cellular injury due to competitive metabolism, toxins, intracellular replication, or antigen–antibody response.* When infection is present, physical symptoms often include fever and chills. Because the hypothalamus regulates body temperature, **Intracranial Regulation** is closely associated with thermoregulation. Traumatic brain injury, with its associated cerebral edema, ischemia, energy failure, oxidative stress, and neuronal death, may directly affect the temperature control center.[17] Often, when injury occurs to the brain or spinal cord, there is interruption of the sympathetic nervous system that prevents peripheral temperature sensations from reaching the hypothalamus. **Perfusion** is affected by body temperature. Measures to minimize or maximize heat loss include vasodilation and vasoconstriction within the blood vessels; severe extremes in body temperature can result in cardiovascular collapse. The skin plays an important role in body temperature regulation. The skin acts as a protective layer to reduce heat loss. In addition, thermoreceptors in the skin alert all individuals to extremes in temperatures, thus preventing injury. These mechanisms require intact skin and **Tissue Integrity**. Metabolism of nutrients provides the body with fuel needed for the generation of heat and body activities. Malnutrition increases the risk for hypothermia because of an inability to generate adequate heat. For this reason, **Nutrition** is interrelated with thermoregulation. **Fluid and Electrolytes** are affected by thermoregulation. Efficient perspiration requires adequate fluid balances. Fluid and electrolyte imbalances can occur when excessive body temperature exhausts available fluids for perspiration.

CLINICAL EXEMPLARS

Although there are many situations and conditions that can cause altered thermoregulation, the distinct exemplars are straightforward (Box 8.2). It is beyond the scope of this book to describe all possible causative factors and exemplars in detail, although brief descriptions of featured exemplars are presented next. Refer to medical surgical, pediatric, geriatric, critical care, and other textbooks for detailed information about exemplars.

Featured Exemplars

Fever

The most common exemplar of thermoregulation is fever. Fever is a temporary elevation in body temperature caused by the immune system's release of endogenous pyrogens (a protein produced by leukocytes) in response to an invasion of bacteria, viruses, fungi, toxins, or drugs.[18] Specifically, pyrogens trigger the hypothalamus to increase the thermostatic set point. The elevated body temperature is thought to increase the production of white blood cells, thus enhancing the immune system response. Fever can also occur due to an exaggerated immune response such as autoimmune disorders or allergic reaction.

Malignant Hyperthermia

Malignant hyperthermia is a hypermetabolic disorder of skeletal muscle triggered by the induction of anesthetic agents and leads to severe hyperthermia. Susceptibility to malignant

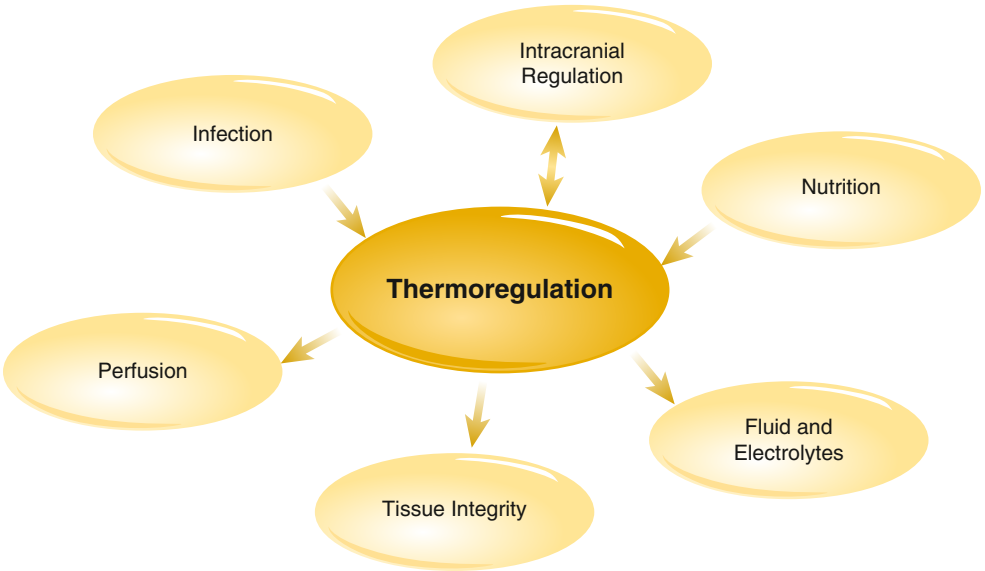

FIG. 8.3 Thermoregulation and Interrelated Concepts.

BOX 8.2 EXEMPLARS OF ALTERED THERMOREGULATION

- Fever
- Hyperthermia
- Heat cramps
- Heat exhaustion
- Heatstroke
- Malignant hyperthermia
- Hypothermia
- Frostbite
- Therapeutic hypothermia

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hyperthermia is inherited as an autosomal dominant disorder; several forms of genetic mutations increase susceptibility. Many of these gene mutations are linked to inherited muscle diseases such as central core disease and multiminicore disease. This disease can cause muscle weakness and other health issues that range from mild to life-threatening. Epidemiologic studies reveal that malignant hyperthermia complicates 1 in approximately 100,000 surgeries in adults and 1 in approximately 30,000 surgical procedures in children.[14]

Heatstroke

Heatstroke occurs with exposure to excessively high temperatures in the environment. The condition often occurs when performing physical exertion in a hot environment without proper ventilation. Hyperthermia results because the body cannot adequately cool itself and keep the temperature at the correct level. The central nervous system may not be functioning properly due to disease or injury. The condition is characterized by alterations in mental status, an increase in body temperature, with hot dry skin; severe conditions can be fatal.

Preterm and Newborn Hypothermia

Preterm and newborn hypothermia occurs with heat loss by radiation, evaporation, and conduction. Mechanisms of heat loss cause the newborn to be dependent on environmental temperature to keep warm. It is recommended that a newborn's axillary temperature be regulated at 36.5°C or 97.8°F. A subnormal temperature requires a radiant warmer for additional heat. Preterm infants are often kept under a radiant warmer or in an incubator with protection from draft air. Swaddling, a cap for the head, and/or skin-to-skin contact are additional ways to keep the infant warm.

Environmental Exposure Hypothermia

Environmental exposure hypothermia occurs from exposure to cold temperatures or immersion in cold water; it is exacerbated by weather elements such as precipitation, humidity, and wind. Without proper clothing or shelter, environmental exposure presents a challenge to the thermoregulatory systems of the body. The body compensates by initiating thermoregulatory mechanisms, such as shivering and vasoconstriction, but eventually a hypothermic state occurs if the exposure is extensive in time and/or severity. Hypothermia due to environmental exposure can occur at any age, although very young and older adults are at greatest risk.[6]

CASE STUDY

From Shironosov/iStock/Thinkstock.

Case Presentation

Tom Anderson is an 86-year-old male who lives with his 82-year-old wife in their home in upstate New York. During the past few years, Mrs. Anderson has noticed a decline in her husband's mental status. Early on a January morning, Mrs. Anderson was awakened at 4 a.m. by the doorbell. When she opened the door, a neighbor was standing with her husband, who was wearing nothing but his pajamas. The neighbor explained that he saw Mr. Anderson wandering outside on the snowy street. Tom was shivering uncontrollably and was confused; the outdoor temperature was only 19°F. Mrs. Anderson immediately called 911 and had her husband transported to the hospital. Upon arrival to the emergency department, the nurse noted the following assessment findings:

- Mental status: Confused; not oriented to person, place, or time
- Vital signs: Temperature, 91.2°F (33.1°C) rectally; pulse, 62 beats/min; respirations, 12 breaths/min; blood pressure, 100/62 mm Hg
- Skin: Pale, cyanosis around lips and extremities
- Uncontrollable shivering

The nurse immediately placed Mr. Anderson in a dry gown, covered him with warming blankets, and placed him in a warm room. The findings were immediately reported to the physician, and the following measures were implemented:

- Stat electrocardiogram followed by continuous cardiac monitoring
- Continuous vital sign and pulse oximeter monitoring
- Cover patient with warming blanket set at 98.6°F (37°C)
- Apply warm oxygen at 3 L/min via nasal cannula
- Blood draw for hemoglobin and hematocrit, electrolytes, blood gases, blood urea nitrogen and creatinine, blood glucose, and toxicology screen

After several hours in the emergency department, Mr. Anderson's core body temperature slowly increased to 95.7°F (35.4°C); he stabilized but remained confused. He was admitted to the medical unit for further evaluation.

Case Analysis Questions

1. What risk factors for impaired thermoregulation are represented by this case?
2. Review the treatment measures described in the clinical management section of this chapter and compare these to this case. How are the interventions similar?

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CONCEPT 9

Sleep

Lichuan Ye

Sleep is a fundamental human need for survival, health, and well-being. Sleep deficiencies, including insufficient sleep duration, poor sleep quality, irregular timing of sleep, and sleep disorders such as insomnia and sleep apnea, are highly prevalent in the general population. The negative effects of sleep deficiencies have been established in the following categories: general health, cardiovascular health, metabolic health, mental health, immunologic health, human performance, cancer, pain, and mortality.[1] Sleep deficiencies have been proposed to be a potential fundamental contributor to health disparities.[2,3] The widespread problem with sleep constitutes a significant public health concern because people are at greater risk for chronic illness, decreased quality of life, and accidents and injuries due to what often are very treatable problems with sleep. Nurses in all settings have an important role in identifying sleep problems, instituting effective strategies to improve sleep, and promoting healthy sleep as part of an overall program of wellness and disease management.

DEFINITION

People tend to think they have a good understanding of sleep, especially because everyone does it and, in fact, every living mammal engages in sleep. It does not seem very complicated to close your eyes and drift into a state detached from the busy day of wakefulness. However, sleep really is quite complex—even more so because the activities and events associated with sleep take place completely outside of the individual awareness. The very nature of sleep means that the person who is sleeping is not aware of the process. Historically, sleep was considered to be merely a period of inactivity. However, with the development of the ability to monitor brain activity it became apparent that sleep really is a period of considerable action. In more recent years, researchers have discovered that a large number of physiologic processes take place during sleep, including neurologic, metabolic, and endocrine activity.

Sleep is a relatively new field of study, and the definitions of sleep are still evolving. Most of the definitions of sleep are based on its distinguishing features from waking, including (1) reduced motor activity, (2) decreased response to stimulation, (3) stereotypic postures (e.g., lying down with eyes closed in humans), (4) relatively easy reversibility, (5) homeostatic regulation such as sleep rebound following sleep deprivation, and (6) loss of conscious of the environment.[4] For example, the Oxford Dictionary of English presents a definition of sleep as "the unconscious state or condition regularly and naturally assumed by man and animals, during which the activity of the nervous system is almost or entirely suspended, and recuperation of its powers takes place."[5] Merriam-Webster added that sleep "is usually considered essential to the restoration and recovery of vital bodily and mental functions."[6] More detailed definitions can be very specific about what is happening in the brain or in differentiating specific stages of sleep. For general purposes, the most important idea is that sleep is *natural, necessary, involves a shift in physiologic and neurologic activity, and is intended to be restorative.*

SCOPE

Sleep occurs in a cyclic pattern following intermittent periods of wakefulness for the majority of humans. The time spent in sleep varies across individuals, as does the time of day during which sleep occurs. Despite such natural variation, there is a recurring need in all humans for a period of physical inactivity and a change in level of consciousness that allows for restoration and for specific physiologic mechanisms to take place. Ideally, after a quality period of sleep, the individual returns to an alert state feeling refreshed and restored.

For a variety of reasons, some people may not feel restored and refreshed after a period of sleep. This may be due to lifestyle or behavior patterns that prevent the individual from receiving the needed amount and quality of sleep. Lack of restorative sleep also may be indicative of a "sleep disorder," which is a diagnosis of a specific pattern of sleep that is not compatible with the health needs of the individual.

Thus, from a broad perspective, the scope of sleep ranges from restorative sleep that results in an individual feeling rested to impaired sleep leaving the individual not feeling rested or refreshed. Impaired sleep can be intermittent or chronic, with chronic impaired sleep being associated with physical, cognitive, and social challenges (Fig. 9.1).

FIG. 9.1 Scope of Sleep.

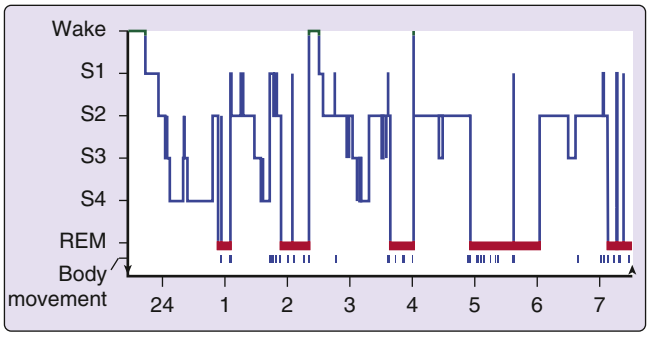

FIG. 9.2 Stages of Adult Sleep Cycle. REM: rapid eye movement; S1, S2, S3, and S4: stages 1, 2, 3, and 4 in nonrapid eye movement sleep. Sum of stage 3 and stage 4 sleep is typically indicated as stage N3, slow wave sleep, or deep sleep. (From Kryger MH, Roth T, Goldstein CA, Dement WC, (2022). *Principles and Practice of Sleep Medicine*. (7th ed.).Philadelphia, PA: Elsevier.)

NORMAL PHYSIOLOGICAL PROCESS

Following a period of wakefulness, humans need to enter a period of rest and sleep that enables them to experience physiologic restoration. Sleep occurs in stages and, under normal circumstances, in a fairly consistent pattern of movement through the stages. In general, the stages of sleep can be divided into two major categories that alternate cyclically across a sleep episode: nonrapid eye movement (NREM) and rapid eye movement (REM) sleep. The four classical NREM stages (stages 1, 2, 3, and 4) roughly parallel a depth-of-sleep continuum, with arousal thresholds generally lowest in stage 1 and highest in stage 4. Sleep begins in NREM and progresses through deeper NREM stages (stages 2, 3, and 4) before the first episode of REM sleep occurs about 80 to 100 minutes later (Fig. 9.2). The American Academy of Sleep Medicine (AASM) scoring manual[7] uses the term N for NREM sleep stages and R for REM sleep; N1 and N2 are used for classic stage 1 and stage 2; N3 is used to indicate the sum of stage 3 and stage 4 NREM sleep, which is often called slow wave sleep or deep sleep in human. The entire sleep cycle (all four stages of NREM plus REM) typically takes about 90 minutes. NREM stages 3 and 4 (stage N3) concentrate in the early NREM cycles, and the duration of REM sleep gets progressively longer across the night. NREM sleep is usually 75% to 80% of sleep, while REM sleep is usually 20% to 25% of sleep, occurring in four to six discrete episodes.

Nonrapid Eye Movement Sleep

In stage 1 (N1 or NREM stage 1), referred to as light sleep, the individual can be awakened easily. In this stage, brain waves slow and, on electroencephalogram (EEG), the slower wave pattern known as alpha (α) waves appears. The individual at this point is likely to drift in and out of sleep and can be awakened easily. Sensations known as hypnagogic hallucinations can occur during this stage. A common sensation of this type is the feeling of falling. Uncontrolled muscle jerks sometimes occur at this stage along with sudden movements that can startle the individual and restore wakefulness.

In stage 2 (N2), eye movement ceases; brain waves become even slower, with the exception of an occasional burst or more rapid brain waves. Pulse rate and respirations slow, and body temperature decreases as the individual moves toward deeper stages of sleep. Stage 3 and stage 4 (N3) are the periods of deep sleep. Stage 3 is characterized by very slow brain waves called delta waves interspersed with smaller, faster waves. In Stage 4, the EEG shows almost exclusively delta waves. In this stage, it is difficult to awaken the individual and muscle activity is very limited. A person awakened from stage 3 or 4 of sleep could be disoriented for a brief period of time before regaining awareness. NREM sleep is usually associated with a relatively inactive yet actively regulating brain in a moveable body.

Rapid Eye Movement Sleep

REM sleep is defined by EEG activation, muscle atonia, and episodic bursts of rapid eye movements. REM sleep commonly begins approximately 90 minutes after the onset of sleep. The first REM period may be rather short, sometimes lasting only 10 minutes. Periods of REM become progressively longer as the individual completes successive sleep cycles, and the final period of REM may last as long as 1 hour. EEGs of REM sleep show patterns of brain activity that are very similar to those produced when an individual is awake. In individuals who have normal sleep patterns (i.e., no sleep disorder), cardiac and respiratory rates increase and become uneven, and the REM for which this stage is named takes place. This also is the stage of active dreaming related to the increase in brain activity. Although the brain is more active, there is a form of muscular paralysis that prevents the individual, in normal circumstances, from engaging in movement or other action that could be very dangerous given the activity of the brain during this time.

Restorative Processes of Sleep

Deep sleep (or slow wave sleep, N3) is essential for the body to accomplish important restorative processes. Not only does such restoration contribute to wakefulness and alertness during nonsleeping hours but also the body undertakes a number of important physical processes, including tissue regeneration, muscle

and bone development, and immune enhancement. Regulation of body metabolism and fat deposition also are affected by the depth and duration of deep sleep. Other hormones associated with sleep and that are essential for health include cortisol, human growth hormone, and leptin and ghrelin—the hormones that regulate appetite and body fat deposition. Sex and reproductive hormones also are affected by sleep and include secretion of testosterone and hormones associated with fertility—follicle-stimulating hormone and luteinizing hormone. An increase in the hormone melatonin at the onset of sleep helps to promote and maintain sleep, and a decrease in levels leads to eventual awakening. The immune system is enhanced as well during sleep as proteins associated with fighting illness are produced. The circadian rhythm, or the typical 24-hour (more or less) cycle through which the body passes, including both awake and sleep cycles, is responsible for regulating all physiologic processes in the body. Therefore, an adequate amount and quality of sleep is essential to all of the regulatory mechanisms that take place in the body.

Age-Related Differences

Sleep is quite consistent throughout the life span with regard to physiologic processes and the need for restoration and renewal. There also is general consistency in the circadian rhythm. Normal variations that occur with aging pertain primarily to the amount of total sleep needed and the amount of time spent in the various stages of sleep. Individual variation does occur and, in many cases, can be considered within normal limits. Such variation is discussed later. The most noticeable changes associated with age include the amount of sleep and the sleep architecture (the constitution of the sleep pattern). The amount of sleep typically needed by people in each age group is as follows:[1,8,9]

- *Newborn (0-3 months):* 14 to 17 hours per 24 hours (including naps)
- *Infant (4-11 months):* 12 to 15 hours per 24 hours (including naps)
- *Toddler (1-2 years):* 11 or 14 hours per 24 hours (including naps)
- *Preschool (3-5 years):* 10 to 13 hours per 24 hours (including naps)
- *School-age (6-13 years):* 9 to 11 hours per 24 hours
- *Teenage (14-17 years):* 8 to 10 hours per 24 hours
- *Adult (18-64 years):* 7 to 9 hours per night
- *Older adult (65+ years):* 7 to 8 hours per night

It is important to remember that these are general recommendations, and some variation will occur. Infants tend to sleep in shorter periods but with multiple episodes of sleep throughout the day. Sleep time gradually decreases during the first several months of life so that by approximately age 6 months, the infant can sleep throughout the night with at least one nap during the day. Newborns enter REM sleep before NREM and have a shorter sleep cycle (approximately 50 minutes). Coherent sleep stages emerge as the brain matures during the first year. At birth, REM sleep is about 50% of total sleep and declines over the first 2 years to 20% to 25%. NREM sleep slow waves are not present at birth but emerge in the first 2 years. Slow wave sleep (N3) decreases across adolescence by about 40% from preteen years and continues to decline slowly into old age.[10]

Older adults may have more difficulty falling asleep, an occurrence referred to as increased sleep latency. They also may experience more awakenings during the night, which leads to a fragmented sleep pattern. Older adults often will awaken more quickly when aroused from sleep. The amount of time spent in deep sleep may decrease, with a corresponding increase in the time spent in N2.[11] These are not necessarily age-related changes; it is likely that medical conditions, such as pain, discomfort, and medication side effects, interfere with the quality of sleep in older adults. While there are changes to sleep architecture with normal aging, short sleep duration (<6 hours) and substantial sleep disturbance should not be considered a normal part of the aging process.[11]

VARIATIONS AND CONTEXT

The National Sleep Foundation conducts periodic studies of sleep habits and outcomes in the United States.[12] This survey has shown consistently that sufficient quality and quantity of sleep are ongoing problems for adults in the United States. In its 2008 study, 49% of people reported not feeling well rested at least several nights per week in the prior month, 65% reported experiencing some type of sleep problem several nights or more per week in the prior month, and 28% reported sleepiness interfering with their daily functioning at least a couple of days per week. Results of the 2015 poll revealed that approximately one-half of the population does not receive the amount or quality of sleep necessary for good health. The 2018 poll was focused primarily on the relationship between pain and other health conditions and sleep, but still revealed that while the majority of the respondents acknowledged that sleep is important, 41% indicated they did not make sleep a priority when they made plans for each day.

Poor Sleep Patterns

Although the amount of sleep needed by each individual varies, research has shown that those who claim they function well on minimal sleep actually respond to tests in a manner consistent with someone who is sleep-deprived. In addition, they are at greater risk of physical problems consistent with inadequate sleep regardless of their subjective assessment of functioning and sleep quality.[12]

Many variations in sleep are the result of controllable phenomena: personal choices about bedtime; dietary habits, ingestion of alcohol or stimulants, frequent napping, and so on. The environment in which someone sleeps can lead to poor sleep quality as well; for example, noise or disruptive light, a television left on, a bed partner who moves frequently or snores, or a lack of safety in the home environment. Caregiving responsibilities, such as ill or elderly housemates or infants and children with interrupted sleep patterns, can affect the sleep of others in the vicinity. Work and job responsibilities may result in poor sleep due to fragmentation as a result of working more than one job or problems associated with shift work. Any of these can result in a substantial disturbance in sleep. Situational challenges such

as worry or stress also can contribute to periodic episodes of ineffective sleep. In such situations, it is common for an individual to have difficulty falling asleep or remaining asleep. Waking several times during the night to deal with worries or stress easily can lead to ineffective sleep. Most people experience ineffective sleep at some, or multiple, points in their lives. When the problem is recurrent or ongoing, the individual may be said to have a sleep disorder.

Research demonstrates that exposure to blue light or light-emitting diodes (LEDs) close to bedtime interferes with restorative sleep as it alters the body's normal regulatory mechanisms.[13] This relationship is so significant that manufacturers of common handheld computer equipment, such as tablets and smartphones, have added capability for the user to set specific times for the device to filter blue light. Research also has shown that some of the age-related disturbances in sleep may be due to the yellowing of the lens of the eye, which affects the transmission of blue light to the retina.[14] This provides additional support for the effect of light and other environmental factors on sleep quality.

Sleep Disorders

Many individuals have a sleep disorder defined in accordance with existing diagnostic standards such as those set by the American Academy of Sleep Medicine. Variations in sleep can occur along several different dimensions. There may be insufficient time spent sleeping, poor quality of sleep despite adequate time, problems falling or staying asleep, intermittent or situational disturbances in sleep, and any number of situations that result in a lack of feeling rested and refreshed on awakening. Problems with sleep become a "sleep disorder" when the difficulty is recurring or chronic. Sleep disorders are fairly common and similar regardless of age. Disorders in children are similar to those of adults, although enuresis (bed-wetting) is more a factor in children, as are sleep-onset anxiety, night terrors, and behavioral problems around bedtime. A sleep-related breathing disorder, obstructive sleep apnea (OSA) is common in both children and adults, affecting 1 billion people worldwide.[15] However, there are significant differences in the underlying pathogenesis, symptoms diagnostic criteria, and treatment for OSA in children compared with adults with OSA.[16] It is estimated that moderate to severe OSA occur in 10% to 17% middle-aged men and 3% to 9% middle-aged women.[17] These rates have substantially increased over the past two decades due to the increasing prevalence of obesity and aging, which are major risks factors of OSA.[17]

Primary Sleep Disorders

Primary sleep disorders are those that exist as an independent condition. According to the International Classification of Sleep Disorders, third edition (ICSD-3), published in 2014, major classifications of sleep disorders include insomnia disorders, sleep-related breathing disorders, hypersomnolence disorders, circadian rhythm disorders, parasomnias, and sleep-related movement disorders.[18]

- Insomnia exists when there is difficulty falling asleep or staying asleep.
- Sleep-related breathing disorders involve either a problem with the airway, as seen in OSA, or a problem with the neurologic drive to breathe during sleep (central sleep apnea).
- Sleep-related movement disorders include disorders such as restless leg syndrome, periodic limb movement disorder, and sleep-related bruxism.
- Parasomnias include a variety of behaviors, such as sleepwalking, sleep terrors, sleep-related eating disorder, and REM sleep behavior disorder.
- Circadian rhythm sleep disorders occur when the drive to sleep does not occur according to what would be considered a normal sleep–wake pattern, such as someone who stays awake until early morning and does not have the drive to fall asleep as nighttime progresses. Examples include delayed or advanced sleep-wake phase disorder and shift work disorder.
- Hypersomnia is characterized by excessive sleepiness or falling asleep at inappropriate times. Narcolepsy is an example of hypersomnia as a primary sleep disorder.

Secondary Sleep Disorders

Secondary sleep disorders occur as the result of some other situation and correcting that situation should resolve the problem with sleep. Secondary disorders are often caused by medical conditions, mental health conditions, and side effects of medical treatments. Box 9.1 presents medical conditions that are commonly known to interfere with sleep. A secondary sleep disorder also may be associated with the use of any medication that has either a sedative or a stimulating effect because either of these actions can interfere with restorative sleep (Box 9.2). Prematurity in infants also may lead to problems with sleep secondary to the state of neurologic or cardiovascular development.

CONSEQUENCES

Excessive daytime sleepiness is a very distressing side effect of insufficient or poor quality sleep. In addition to the psychological

BOX 9.1 Common Conditions That Affect Sleep

- Alzheimer's disease
- Anxiety
- Arthritis
- Asthma
- Cancer
- Chronic obstructive pulmonary disease
- Chronic kidney disease
- Depression
- Diabetes
- Epilepsy
- Febrile conditions
- Fibromyalgia
- Gastroesophageal reflux disease
- Heart failure
- Hyperthyroidism
- Menopause
- Pain
- Parkinson's disease
- Stroke

BOX 9.2 Common Pharmaceutical Categories That Impair Sleep

- Antiarrhythmics
- Antihistamines
- β-blockers
- Corticosteroids
- Diuretics
- Nicotine products
- Selective serotonin reuptake inhibitors
- Theophylline
- Thyroid hormone

and emotional challenges of sleepiness, the physiologic consequences of poor sleep are widespread and can be serious. When sleep is inadequate, a large number of basic regulatory mechanisms of the body do not function effectively. Commonly occurring physiologic consequences of poor sleep include hypertension, heart disease, heart failure, stroke, obesity, and developmental disorders that may be related to physiologic factors such as alternations in growth hormone. Reproductive disorders can occur due to disruption in hormonal regulation. Compelling evidence from prospective population studies suggests that both short and long duration of sleep are significant predictors of high mortality.[19] Immune function also is diminished in cases of inadequate sleep.[20] Negative health consequences of untreated OSA include impaired cognition,[21] hypertension,[22] cardiovascular diseases,[23] diabetes,[24] demised quality of life,[25] and increased mortality.[26] It is quite common clinically to see individuals with multiple health problems, including diabetes, heart disease, and hypertension, who have a concomitant sleep disorder as a potential causative or aggravating factor in the physical problems. In children, poor sleep quality or insufficient sleep may be manifested primarily by developmental and behavioral abnormalities that may have physiologic components as well.[27]

RISK FACTORS

Every human being is at risk for sleep problems. Wherever sleep exists as a part of the life pattern, there is the potential for challenges with sleep or diagnosable sleep disorders. Although the risk for sleep problems is widespread, several known factors place individuals or groups at greater risk; also, risk factors are not easily generalizable because some risk factors are unique for specific sleep problems. Assessment of sleep can be made easier by recognizing common risk factors associated with various conditions. Biologic needs for sleep are met by engaging in behaviors that are largely influenced by the environment, social norms, and societal influences. Therefore, sleep can be influenced by factors at individual level (e.g., health, beliefs, attitudes, and sleep hygiene practice), social level (e.g., family, work, neighborhood, socioeconomics, and culture), and societal level (e.g., environment, technology, public policy, and 24/7 society).[28]

Populations at Risk

As a population, middle-aged and older individuals are at greater risk for nearly all adult sleep disorders. Hormonal changes, changes in routine and lifestyle with advancing age, and the development of medical conditions (and subsequent symptoms and treatments) are all common among people as they age. Women tend to be at greater risk for some sleep disorders, including insomnia and restless leg syndrome. Pregnant individuals and perimenopausal women often experience sleep disturbances as a result of hormone fluctuations that can disrupt sleep through night sweats or lead to symptoms of insomnia. Additionally, changes in body shape during pregnancy can create discomfort and difficulty breathing when lying down as well as pressure on the bladder that can lead to frequent awakenings. Men are at higher risk for OSA than women until menopause, at which point the risk for women increases to near that of men. Growing evidence suggests that significant sleep health disparities exist, such that racial/ethnic minorities, especially in the context of socioeconomic disadvantage, achieve less quality sleep.[29,30] Compared with non-Hispanic Whites, Black/African Americans are more likely to report insufficient sleep and poor sleep quality, and are more likely to suffer persistent, severe, and underdiagnosed sleep disorders, which can lead to significantly higher morbidities, mortalities, and poor quality of life.[10,29]

Individual Risk Factors

The most notable individual risk factors are related to family history, individual behaviors, and underlying conditions.

Family History

Family history is a significant factor in the occurrence of most sleep disorders, including OSA, narcolepsy, and insomnia. However, the nurse is not likely to have this information unless a thorough history is obtained. The completion of a thorough history is complicated by the fact that it is quite common for people not to know that a family member did, in fact, have a sleep disorder.

Individual Behavior

Individuals who work variable shifts, particularly involving night shifts (e.g., emergency medical technicians and firefighters), are at risk for ineffective sleep and sleep disorders, especially if they try to maintain a typical daytime period of wakefulness on days they are not working. Also at risk for sleep disorders are those who work very long hours and have monotonous routines such as truck drivers.

Individuals who have undergone a recent life change or are experiencing increased stress are at high risk for sleep problems, particularly insomnia. Those who have irregular daily routines often experience problems with inadequate sleep or poor sleep quality, and the idea that it is possible to "catch up" is believed by many; however, research shows that such attempts to catch up are not effective and do not compensate for poor sleep at other times. Drug and alcohol use along with dietary behaviors, such as consumption of stimulants, also interfere greatly with sleep. Other dietary habits, watching television in bed, disturbance from light, or a bed partner who is restless or has different sleep times all can interfere with the quality of sleep an individual receives. Child care and other responsibilities can disrupt sleep as well. Many people live in environments in which they do not

feel safe either for domestic reasons or because of the environment surrounding their residence. An overwhelming number of people who report poor "sleep hygiene" experience insufficient and poor quality sleep.

Underlying Medical Conditions

A significant risk factor for ineffective sleep is having one or more underlying medical conditions, pharmaceutical agents used to treat medical conditions that interfere with sleep, or the treatments for those conditions interfere with sleep (see Boxes 9.1 and 9.2). Symptoms that commonly interfere with sleep include pain, problems breathing, and anxiety.

Persons with retrognathia (receding jaw) and micrognathia (small jaw structure) or with craniofacial abnormalities are at greater risk for OSA, as are children with tonsillar enlargement. Obesity commonly is reported as a risk factor for OSA as well, although it is important to note that OSA is also diagnosed in individuals who are not obese. Sleep disorders also are commonly associated with heart disease and respiratory conditions as both an outcome and a risk factor. Therefore, individuals with heart and respiratory problems should be evaluated for sleep quality. In women, polycystic ovarian syndrome has been found to be highly associated with poor sleep and sleep disorders, including OSA.[31,32]

ASSESSMENT

Although assessment of sleep is a component of health assessment, this is not addressed consistently by healthcare personnel. Practitioners do not always ask patients about sleep, and when concerns are discussed, clinicians may have difficulty differentiating fatigue or tiredness from sleepiness. In view of the importance of sleep to overall health, nurses should incorporate sleep assessment with all patients with whom they interact to determine whether individuals are getting sufficient restorative sleep.

Assessment of sleep is complicated by the fact that individuals cannot subjectively determine the quality of their sleep. Individuals with OSA, for example, might say they "sleep" 10 hours each night and do not understand why they are so "tired." However, during that 10 hours, they have no way of knowing what is happening to their bodies. People also quite commonly report feeling "tired," but "tired" may be the result of many different conditions or factors. Tired, fatigued, and sleepy are very different in origin. Someone who has difficulty falling asleep or awakens frequently might complain of "insomnia," but awareness of what actually happens during sleep is usually limited. In terms of assessment, then, it is important to recognize that time spent in bed is not a good indicator of amount or quality of sleep. Problems with sleep result in "sleepiness," which can be differentiated from tiredness or fatigue. There are instruments that, with a few questions, can determine someone's sleepiness or likelihood of falling asleep under certain circumstances. For example, Epworth Sleepiness Scale is the most commonly used scale including items about the likelihood of falling asleep in eight soporific situations, with score 10 and above indicating excessive daytime sleepiness.[33]

History

Start by asking the individual how he or she feels upon awakening. Ideally, the person awakens feeling rested and refreshed. Any response to the contrary indicates less than ideal sleep. The individual may not feel rested and refreshed on awakening, may lack energy to do the things he or she enjoys, or may feel less productive at work. Statements indicating weakness, malaise, lack of appetite, and so on may accompany reports of fatigue.

A description of what happened while trying to sleep should come next. If the individual reports difficulty falling asleep, assessment should include a discussion of what happens when the individual tries to sleep. Are thoughts racing? Is there discomfort that prevents sleep? Does the individual feel safe while sleeping? Does the individual awaken during the night or awaken early in the morning? What awakens him or her? What happens around any awakening? Inquire about the sleeping environment, including the bedroom and comfort factors such as light and temperature. Specific inquiry regarding physical symptoms, including discomfort or need to urinate that might lead to awakening, can be helpful, along with any other symptoms such as headache, dry mouth, or nasal stuffiness. Inquire about the thoughts, worries, or concerns the individual might be aware of when awakening. Can the person return to sleep quickly after being awakened? What position is the individual in when awakening? Is the bed in disarray, indicating the person has been very active while sleeping? If there is a bed partner, any observations made about the person's behavior while asleep can be very informative.

A detailed history of behavior prior to sleep is key to determining whether or not a sleep problem exists and what the nature of that problem might be. Fatigue is an extremely common symptom of impaired sleep, and, in many cases, the cause is behavioral in origin. The individual stays up late during the week, perhaps to watch television or have some quiet time after tasks are completed, and then arises early the next morning. The use of medications, recreational drugs, stimulants, alcohol, sedentary or active lifestyle, and dietary habits can be associated with sleep problems. Daytime napping may contribute to poor sleep at night, as may other possible factors, such as stress, dietary habits, lack of exercise, and exposure to LEDs near bedtime.

A thorough review of systems is important to identify problems that might indicate an underlying sleep disorder, such as pins and needles feelings in the legs or pain or nocturnal urination that disrupt the pattern of sleep. Headache, respiratory problems, dry mouth or sore throat, heartburn or reflux, a feeling of the heart beating either very fast or irregularly, a pins and needles feelings, or pain in any part of the body are all possible findings on the history and review that may be indicative of a sleep disorder. Also, family history is significant because there is a strong familial predisposition for most of the sleep disorders.

Examination Findings

Relatively few physical exam findings directly indicate a sleep disorder. However, sleep disorders are more common in people with upper airway or craniofacial construction that can lead to a more easily obstructed upper airway. Micrognathia,

retrognathia, enlarged tonsils, somewhat thicker tongue, and a generally smaller upper airway are common in people with OSA. A measurement known as the Mallampati score is a determination of the difficulty of inserting an oral airway and reflects the oropharyngeal crowding on a 4-point scale.[34] This measurement is helpful in assessment of the risk for OSA. A Mallampati score of 3 or 4 is common in individuals with OSA. Neck circumference of 16 or greater in women and 17 or greater in men also is associated with OSA. Although obesity may be a result of sleep problems and not a cause, there is a higher incidence of OSA in people with higher body mass index (BMI). Therefore, a BMI of 30 or greater may indicate a possibility of OSA. OSA also can occur in people with normal or lower BMI, so it should not be relied on as an exclusive screening tool for OSA.

Physical examination of respiratory and cardiac function is helpful because such conditions often are associated with sleep disorders either as sequelae or by raising problems with circulation and oxygenation that then interfere with sleep. Cardiac function and general skin and mucous membrane color can indicate oxygenation status and, thus, can alert the nurse to possible sleep problems. Neurologic changes also tend to have an effect on sleep quality; therefore, abnormalities detected on examination of this system might point to the existence of challenges to sleep.

Diagnostic Tests

In addition to the history and physical examination, there are a variety of tools and tests used in evaluation of a patient with sleep problems, including questionnaires, sleep diaries or logs, actigraphy, nocturnal polysomnography, a home sleep test, or a Multiple Sleep Latency Test.

The only definitive tests for sleep problems are those that measure activity and events related to sleep and wakefulness. These are most often done after referral to a sleep medicine specialist who can determine the most likely cause of the sleep problem and order appropriate tests. An actigraph is a device that is worn on the wrist to record general movement. Analysis of the recording using special software can provide an estimate of sleep patterns and may be a helpful adjunct to subjective reports and sleep diaries. Actigraphy has been found to be a valid measure in a variety of populations, although it is not a diagnostic tool.[35]

Polysomnography

One of the most important tests to identify sleep disorders is the polysomnography (PSG). A nocturnal laboratory-based PSG is considered the gold standard for OSA diagnosis, assessment of OSA severity, and identification of other sleep disorders that can accompany OSA. A PSG is conducted while an individual sleeps and includes the monitoring of multiple physical parameters. PSGs use an array of electrodes and monitoring devices that can vary depending on the specific reason for conducting the study. Generally, however, a PSG will involve EEG-type electrodes to monitor sleep patterns and stages, stretching belts to measure respiratory effort, leads to monitor muscle activity (typically on the limbs but also for chin/jaw and eye movement), nasal and oral airflow, and pulse oximetry. Monitors to document body position also may be indicated, and the entire experience often is recorded on videotape.

Registered PSG technicians conduct these studies in clinical facilities designed specifically for overnight sleep studies; this also includes video monitoring and, if indicated, the capability for initiating and titrating positive airway pressure therapy for people found to have OSA during the PSG. Individuals who work at night and sleep during the day should have their studies done during the daytime to match their usual routine. As the medical community became aware of the prevalence and consequences of OSA, more convenient, less resource-intense portable monitoring tools such as a home sleep apnea test (HSAT) were developed and are now widely used. However, due to limited variables monitored during HSATs, they do not typically allow identification of sleep stage or muscle activity and, therefore, cannot be used for the objective confirmation of sleep disorders other than OSA.

Sleep Journals

Other means of data collection to help in the diagnosis of sleep problems are subjective in nature, particularly the maintenance of a sleep journal. Individuals may be asked to record a summary of their daily activities, dietary intake, bedtime, discussion of what happened during the night, and time of awakening. Subjective assessment on awakening, such as whether or not the individual feels refreshed and restored on awakening, can be an important adjunct to other means of measuring and assessing sleep. As noted previously, subjective assessment of sleep is fraught with difficulties because an individual who is sleeping is not aware of what is happening during sleep.

CORE COMPETENCIES

Sleep

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to sleep.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related sleep and common sleep disorders.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to the promotion of sleep and management of sleep disorders for individuals, communities, and populations.
- Using a person-centered approach, evaluate the plan of care and implement interventions to address sleep deficiencies including insufficient sleep, poor sleep quality, irregular timing of sleep, and sleep disorders in individual patient, family, and community.

CLINICAL MANAGEMENT

Clinical management of sleep problems varies with the nature and type of problem or disorder. Regardless of more specific interventions that might be indicated, improvement in sleep begins with understanding and implementing behaviors that are conducive to quality sleep, an approach that is referred to generally as sleep hygiene. The major components of sleep hygiene are the sleeping environment and personal behavior. Proper sleep hygiene often is enough to remedy problems with

sleep and is the foundation for quality sleep. It is also something that nurses can work with independently and make a significant difference in the lives of people with whom they work (and in their own).

Primary Prevention

Sleep hygiene is a critical link in healthy sleep and either avoiding or managing sleep problems. Sleep hygiene includes attention to the environment for sleep and to personal behavior. The sleeping environment should be comfortable, well ventilated, quiet, and as dark as possible. The optimal temperature for sleep usually is a bit cool (typically 60°F–67°F); either cold or too warm a temperature can interfere with sleep quality. The bed should be used only for sleep and sexual activity. Bedding and blankets should be evaluated along with other factors of the environment to determine whether something in the bed or environment overall is detracting from the quality of sleep.

Personal behaviors and habits are widespread causes of sleep problems. A lack of time spent in sleep often contributes to daytime sleepiness. A large number of sleep complaints and problems stem from not allocating enough time to sleep or not making sleep a priority. Too often sleep is done only when everything else in the person's busy life has been completed. The healthiest pattern is to have a consistent bedtime and awakening time and to adhere to that pattern at all times. Sleep also needs to be a priority; the motivation to sleep, and placing a priority on sleep, usually are associated with good sleep habits and sleep quality. Napping generally is discouraged except in cases in which the naptime is short (30 minutes or so) and the individual has no problem falling asleep at bedtime. Dietary habits, particularly alcohol and stimulants, should be avoided as bedtime approaches, generally 4 to 6 hours before bed. Alcohol, stimulants, eating a heavy meal, spicy foods, or sugary foods should be avoided 4 to 6 hours before bedtime. Regular exercise is very conducive to healthy sleep, although many people find that it is not beneficial to exercise close to bedtime.

Use of over-the-counter sleep products can interfere significantly with quality sleep patterns, and it is easy for an individual to feel dependent on the product for sleep. Older adults, particularly, may consume products that contain antihistamines and other sedating drugs without being aware that these can actually contribute to persistent sleep problems. Many products marketed for nighttime pain relief contain other drugs that may interfere with quality sleep. Even those advertised to help with sleep can, with regular use, negatively affect healthy sleep patterns. Therefore, primary prevention focuses on good sleep hygiene and the elimination, when possible, of factors that may interfere with or limit the quality of sleep.

Secondary Prevention (Screening)

A number of instruments can be used for more focused screening of sleep problems. The American Academy of Sleep Medicine has a screening tool that addresses a variety of sleep problems. Selected aspects of this tool can be adapted and used for screening as appropriate to the population and as screening reveals aspects of sleep that warrant a more specific focus.[36]

Other professional organizations that are focused on sleep, along with a number of clinical agencies, have developed their own screening tools for use in assessing sleep quality and the presence of sleep problems specific to the populations with which they work. Nurses will not have difficulty finding age and developmentally appropriate screening tools. Because of the subjective nature of sleep quality, considerable screening can be accomplished with some fairly simple questions that determine whether the individual awakens rested and refreshed and whether some lifestyle or behavioral factors might be responsible for any problems in this area.

Collaborative Interventions

Sleep Hygiene

Sleep hygiene, as noted previously, is the foundation of any approach to improving sleep and, thus, is applicable as a prevention strategy and an intervention for sleep disturbances. Without a good foundation of appropriate lifestyle and behavioral approaches to sleep, other interventions will fall short of the desired outcome of quality and restorative sleep. Despite the importance of a solid foundation of sleep hygiene, that alone is not always sufficient to resolve existing sleep problems. Collaboration with individuals capable of prescribing other interventions, then, becomes necessary. In most cases, referral should be made to a sleep specialty center for more thorough assessment and diagnosis.

Pharmacologic Agents

Drugs with pharmacologic effects on the neurochemical systems involved in sleep-wake regulation may have therapeutic or impairing effects on sleep wake behavior. Drugs that inhibit arousal systems may improve sleep but adversely affect wake behavior, whereas drugs that activate arousal systems may improve sleepiness but disrupt sleep. These medications may also affect duration, timing, and architecture of sleep. For example, the current drugs with U.S. Food and Drug Administration (FDA) indication for insomnia facilitate sleep by enhancement of GABA inhibition (benzodiazepines, nonbenzodiazepines [Z drugs]), antagonism of histamine 1 (low dose doxepin) or orexin (lemborexant, suvorexant), or melatonin agonism (ramelteon). In general, pharmaceutical sleep aids and other medications designed to address sleep problems should be used only after a thorough assessment, and after measures related to improved "sleep hygiene" have been implemented. These should be used with caution, and the patient should be monitored for effectiveness. For some conditions, such as restless leg syndrome, specific agents targeting the nervous system are used. These would require referral to a neurologist or sleep specialist for assessment and determination of an appropriate treatment regimen.

Exogenous melatonin or melatonin agonists can be used in cases of circadian rhythm problems and difficulties associated with maintaining a functional sleep–wake pattern. Exogenous melatonin has been classified by the U.S. FDA as a dietary supplement and is not subject to the regulation given to pharmaceuticals. Dosing and timing of administration are critical for the clinical effectiveness of melatonin. Low doses (0.5 mg or lower) of melatonin can advance (evening administration)

or delay (morning administration) the timing of the circadian clock. Higher doses are more effective at inducing sleep onset or used in REM sleep behavior disorder, while sustained-release formulations could be helpful for sleep maintenance.[37]

Cognitive Behavioral Therapy

Cognitive behavioral therapy for insomnia (CBT-I) is a brief and effective multicomponent treatment that alters behaviors and thoughts associated with insomnia disorder. CBT-I has increasingly been recognized as the "gold-standard" treatment for chronic insomnia. There is strong empirical evidence for the efficacy of CBT-I in reducing insomnia severity and improving sleep among individuals with insomnia, either alone or comorbid with other disorders.[38,39] The most common elements of CBT-I include stimulus control, sleep restriction, cognitive therapy, counterarousal strategies, and sleep hygiene. Access to CBT-I can be enhanced with telehealth, web-based, or digital programs.

Invasive Procedures

For individuals with upper respiratory system obstructions such as upper airway resistance syndrome or OSA, dentists and oral surgeons with additional and specialized education in sleep disorders can perform surgical procedures to provide more openness to the airway or construct oral appliances that aid in keeping the airway open during sleep. Oral appliance therapy with custom-made mandibular advancement devices is a first-line, nonsurgical alternative for treatment of sleep-disordered breathing. In selected patients, surgical treatment options for OSA are available, such as upper airway modifications including upper airway surgery and neurostimulation therapy of the hypoglossal nerve.

Positive Airway Pressure Treatment

Effective treatment for OSA can be achieved through the use of Positive Airway Pressure (PAP), which is the primary and most efficacious therapeutic option for OSA.[40] PAP is delivered by a small bedside airflow generator that compresses room air conveying it under pressure to the patient's nasal passages via a mask held in position with elastic headgear. To be effective therapeutically, PAP should be consistently applied throughout sleep every night. Unfortunately, less than 50% of OSA patients adhere to this guideline.[41] With increasingly robust evidence for the benefits of PAP and a scarcity of effective treatment alternatives, poor adherence to PAP remains the foremost obstacle in the management of OSA.[42] Nurses are frequently involved in the interventions to support the use of PAP treatment for patients with OSA.

INTERRELATED CONCEPTS

A number of concepts are related to sleep through their essential role in healthy sleep patterns. The number of concepts that are related to sleep is quite extensive. The concepts of greatest concern in discussing sleep directly are presented in Fig. 9.3.

Perfusion and **Gas Exchange** are shown with bidirectional arrows in Fig. 9.3 because poor perfusion can cause problems sleeping and poor sleep exacerbates many cardiac and respiratory conditions, such as coronary artery disease, chronic obstructive pulmonary disease, and asthma. **Cognition** is also shown with a bidirectional arrow because many individuals with impaired cognition experience sleep disturbances and impaired sleep can affect cognitive function. Individuals experiencing **Pain** often have problems sleeping—unless the pain can be adequately managed. Changes in **Hormonal Regulation**, such as increased thyroid secretion, can alter stages of sleep, and altered sleep can affect hormone regulation. Problems with **Elimination** are known to be disruptive to sleep, particularly in adults; enuresis (bed-wetting) is an example of a childhood sleep dysfunction. **Fatigue** is a common outcome associated with impaired sleep. **Stress and Coping** can be affected significantly by quality of sleep as well, with lack of sleep creating difficulties with daily functioning and resilience.

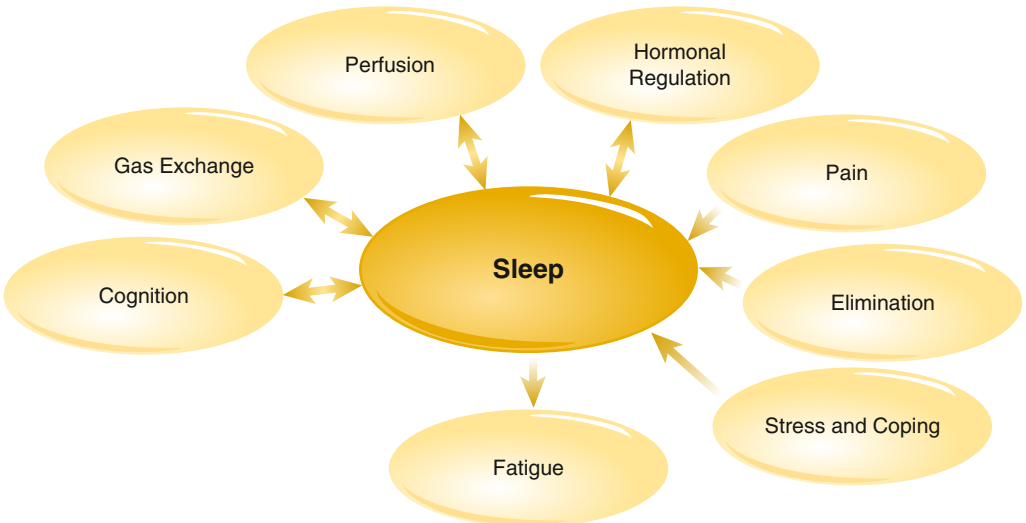

FIG. 9.3 Sleep and Interrelated Concepts.

BOX 9.3 EXEMPLARS OF SLEEP DISORDERS

Circadian Rhythm Sleep-Wake Disorders
- Advanced sleep-wake phase disorder
- Delayed sleep-wake phase disorder
- Jet lag disorder
- Shift work disorder

Insomnia Disorders

Hypersomnolence Disorders
- Narcolepsy

Parasomnias
- Disorders of arousal (from NREM sleep) such as sleepwalking and sleep terrors
- REM sleep behavior disorder
- Sleep enuresis

Sleep-Related Breathing Disorders
- Obstructive sleep apnea
- Central sleep apnea
- Hypoventilation/Hypoxemia
- Obesity-hypoventilation syndrome

Sleep-Related Movement Disorders
- Restless leg syndrome
- Periodic limb movement disorder
- Sleep-related bruxism

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CLINICAL EXEMPLARS

There are many types of sleep disorders that serve as exemplars of this concept. Exemplars are presented in Box 9.3 organized by the disorder category as appropriate. Although a detailed discussion of each of these exemplars is beyond the scope of this text, several are briefly described next. Refer to pediatric, medical, surgical, and geriatric references for additional information.

Featured Exemplars

Insomnia

The term insomnia refers to the inability to fall asleep or stay asleep and can last a few days (transient) or can occur over time. Chronic insomnia disorder is defined as *persistent sleep difficulty of at least 3 months despite adequate opportunity and circumstances for sleep, which is accompanied by daytime consequences that are attributable to the sleep disturbance.* Insomnia can be associated with any number of conditions, including acute stress, pain, depression, and underlying medical conditions, and it can occur as a result of drug or alcohol use. A common scenario involves an individual who is stressed by work or life events, lies in bed with thoughts racing, cannot stop thinking about the events of the day or concerns, and consequently cannot fall asleep or cannot maintain sleep, waking up in the middle of the night only to have the disturbing thoughts gathering attention again.

Circadian Rhythm Sleep-Wake Disorders

The key feature of these disorders is an alteration of the circadian clock or a persistent misalignment between the individual's sleep pattern and the pattern that is required or desired by the environment or societal demands. For example, delayed sleep-wake phase disorder, which is commonly seen in adolescents and young adults, is characterized by a delay in the major sleep period in relation to the desired sleep time and wake time. More commonly seen in older adults, advanced sleep-wake phase disorder is characterized by an advance in the phase of the major sleep period in relation to the desired sleep and wake-up time. Circadian rhythm sleep disorders are also common among individuals who work variable shifts (particularly night shifts) and those who do extensive travel. For those who travel across time zones, the term "jet lag" is often used because the individual's body time is not synchronized with the environmental time, thus affecting the sleep–wake cycle. There is a direct correlation between the severity of symptoms and the number of time zones crossed. Shift work disorder is characterized by complaints of insomnia or excessive sleepiness that occur because of work hours that overlap the usual sleep period.

Narcolepsy

Narcolepsy is one type of central disorder of hypersomnolence. Hypersomnolence indicates an irrepressible need to sleep or daytime lapses into sleep; thus, it encompasses the symptoms of excessive need for sleep and excessive daytime sleepiness. Patients with narcolepsy have unexplained daytime sleepiness and can rapidly transition into REM sleep. Most patients with narcolepsy have cataplexy, a sudden occurrence of muscle weakness in association with laughing, joking, or anger. This is caused by a unique autoimmune pathophysiology targeting the hypocretin/orexin neurons which are wake-promoting neurons located in the posterior hypothalamus. Individuals with narcolepsy often find it difficult to stay awake for long periods of time, and they may experience brief periods of falling asleep throughout the day. This condition can lead to poor school and work performance, creating significant challenges, including reduction in functional ability.

Obstructive Sleep Apnea

OSA consists of recurrent episodes of upper airway obstruction or narrowing at night, and may be associated with recurrent hypoxia, sleep fragmentation, and elevation of sympathoadrenal tone. Common symptoms of OSA include heavy snoring, excessive daytime sleepiness, mood disturbances, morning headache, and impaired cognition and performance. OSA has been identified as an independent risk factor for hypertension, cardiovascular disease, stroke, and insulin resistance.

Obesity-Hypoventilation Syndrome

Obesity-hypoventilation syndrome (OHS) has been defined by the combination of obesity and daytime hypercapnia (increased carbon dioxide levels in the blood) during wakefulness occurring in the absence of an alternative explanation for hypoventilation. This syndrome is invariably accompanied by sleep-disordered breathing such as OSA or sleep hypoventilation with a wide range of severity. In fact, approximately 90% of patients with OHS have OSA defined by an apnea-hypopnea index of at least five events per hour. Patients with OHS have a low quality of life with increased healthcare expenses and are at higher risk of developing pulmonary hypertension and early mortality. Unfortunately, OHS often remains underdiagnosed until late in the course of the disease.

Disorders of Arousal

Disorders of arousal (DOA) encompass a broad clinical spectrum from mild, nondisruptive episodes, such as mild confusion with sleep talking, to aggressive and potentially injurious motor disturbances such as sleepwalking and sleep terrors. The episodes can last for a few seconds to minutes and are associated with partial or complete amnesia. They are thought to take place during an incomplete transition from NREM deep sleep to wakefulness. Essential physiologic drives, such as hunger, aggression, and sex, may be manifested by sleep-related eating, violence, or sexual behaviors. Age at onset for DOA is often childhood or adolescence with resolution after puberty, but it may persist into young childhood.

CASE STUDY

From Michael Greenberg/Digital Vision/Thinkstock.

Case Presentation

Jim Wyatt is a 42-year-old male, 5 ft. 11 in. and 200 pounds, with a BMI of 27.9 (considered overweight according to BMI tables). He reports being tired "all the time." Other health problems include hypertension that is poorly controlled with three prescription medications and an HgbA1C level that has been rising, with the most recent measure at 6.2. On a typical day, he awakens at 6:30 a.m., often with a significant headache and feeling like he has not gotten a good night's sleep. He adds that on most mornings, he has a dry mouth as well. He is worried that his work performance is suffering, and he has trouble staying awake at meetings. He had one minor traffic accident recently when his car went off the road after he fell asleep at the wheel. He often will nap when he gets home from work, and he falls asleep watching television after dinner. He attempts to go to bed at approximately 9:30 or 10:00 p.m. each night with the hope of getting enough sleep so he will not be so tired the next day. He has stopped going to social events in the evening due to the difficulty he has staying awake. On a recent camping trip, his companions teased him about his loud snoring. He explains that his father "was the same way." On physical exam, the nurse notes that he is having difficulty staying awake while he is talking, and he has a neck circumference of 17½ in. On examination of his oropharynx, the nurse cannot visualize the uvula or tonsils.

Case Analysis Questions

1. Consider Fig. 9.1. Where on the scope of sleep does Mr. Wyatt fall?
2. What risk factors does Mr. Wyatt have that are associated with impaired sleep?
3. How would you describe the effect of Mr. Wyatt's sleep issues on his quality of life?

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CONCEPT 10

Cellular Regulation

Kevin Brigle

The cell is always speaking—the secret is to learn its language.

Andrew S. Bajer, Cell Biologist

Cells are the smallest form of life; they are the functional and structural units of all living things. Cellular activity is an intricate, redundant, tightly regulated process that functions not only throughout the lifespan of an *individual* cell but also between cells. To maintain health, cells constantly send, sense, and respond to chemical cues and correct mistakes whenever possible. When this is not possible, specific cellular pathways activate to remove individual cells that no longer function as they have been programmed to do. Although the thousands of complex interconnected circuits of cellular regulation have tremendous fidelity, irreparable errors can occur at many steps along these pathways. These "fixed" errors lead to permanent abnormal changes that affect biophysical health, psychosocial health, and the functional status an individual. Nurses should be familiar with the scope and process of cellular regulation, the consequences of altered cellular regulation, and the healthcare priorities to implement when conditions of altered cellular regulation develop.

DEFINITION

The term *cellular regulation* refers to all functions carried out within a cell to maintain homeostasis, including responses to extracellular signals (e.g., hormones, cytokines, and neurotransmitters) and mechanisms by which intracellular signals are produced.[1]

Included within these functions is cellular replication and growth. Terms used to describe the detailed aspects of cellular reproduction and growth include *proliferation* and *differentiation*. Proliferation refers to the production of new cells through cell growth and cell division. Differentiation refers to the acquisition of a specific cell function, a normal process by which a less specialized cell becomes more specialized. Another important term associated with this concept is *neoplasia,* an abnormal and progressive multiplication of cells that leads to the formation of a neoplasm or tumor. A neoplasm refers to an abnormal tissue growth that is uncontrolled and progressive, and neoplasms can be categorized as either benign or malignant (cancerous).

SCOPE

The concept of Cellular Regulation is quite broad and represents all aspects of cellular function. Some of the basic functions that many cells have in common include creating fuel for the body, manufacturing a complex array of proteins, transporting materials, and disposing of waste. Included in cellular regulation is cellular division and reproduction—processes that are strictly controlled in normal cells but corrupted in malignant cells. The scope of this concept analysis focuses on the *cellular growth and reproduction* aspects of cellular regulation and the development of malignant neoplasms. In this context, normal cellular growth is at one end of the spectrum, whereas malignant neoplasia is at the opposite end. Within this continuum is dysplasia, which describes morphologically abnormal cells having high risk of becoming malignant (Fig. 10.1).

NORMAL PHYSIOLOGICAL PROCESS

Normal Cellular Reproduction and Growth

Cellular replication is an extraordinarily efficient process, with millions of cells generated daily over the course of an individual's life. New cells are formed through a process of cell division referred to as proliferation. The rate of cellular proliferation varies according to the needs of the tissue involved. For example, there is rapid proliferation in areas where cellular turnover is high, such as the bone marrow and the epithelium that lines gastrointestinal tract, whereas slower proliferation occurs in muscles, cartilage, and bone where cellular turnover is more limited.

There are two kinds of normal cell division: mitosis and meiosis. Mitosis is essentially a duplication process: Two genetically identical "daughter" cells are produced from a single "parent" cell. Mitosis may take place in cells anywhere in the body to keep tissues and organs in optimal working order. Normal cells

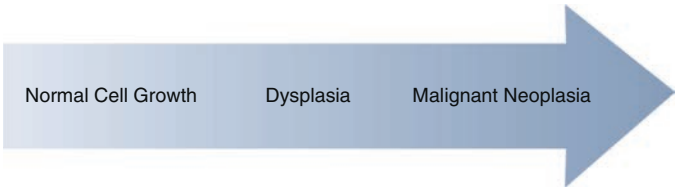

Fig. 10.1 Scope of Concept: Cellular Regulation.

capable of mitosis divide for only one of two reasons: to develop normal tissues or to replace lost or damaged normal tissues. Meiosis on the other hand, generates "daughter" cells that are purposely distinct from one another and from the original "parent" cell. Although nearly all cells are capable of mitosis, only a few special cells are capable of meiosis—those that will become eggs in females and sperm in males. Basically, mitosis is necessary for the growth and maintenance of normal tissues, whereas meiosis is necessary to create cells for sexual reproduction.

Replication

Cellular replication is activated in the presence of cellular degeneration and death or based on physiological need. That is, when replication is functioning normally, new cells are created at the same rate that older cells die. The determination and timing of cellular division are strictly controlled by molecular "stop" and "go" signals. For example, when a wound occurs, injured cells send "go" signals to the surrounding cells, which respond to these extracellular signals by activating intracellular proliferation pathways. This results in controlled cellular growth and division that, in time, seals the wound with new cells. Conversely, "stop" signals are sent by the newly formed tissue when the wound healing process nears completion and cell replacement is no longer required. However, in a pathologic process, these signals function abnormally—a "go" signal may be produced when it should not be or a "stop" signal may be ignored by the surrounding cells. Such errors could result in uncontrolled growth and the development of neoplasms. However, because of redundancy in error-correcting cellular regulation mechanisms, it takes more than one incorrect "stop" signal or "go" signal for neoplasia to develop. The human body is quite efficient at protecting its essential systems, and generally, multiple errors must be compounded over time for healthy cells to become malignant. [2]

With normal replication, cells proceed through a cycle (known as the cell cycle) during which the entire cellular contents of the parent cell are duplicated and then undergo mitosis (cell division), splitting into two identical daughter cells. This cell cycle follows an orderly progression; certain steps need to precede others for the process to continue. Initially, the cell must leave the resting state, G_0 (gap 0), in order to enter the cell cycle. This initial entry into the cell cycle is an irreversible act, and it commits the cell to either continue through mitosis or exit by cell death. Cells cannot reverse the process and go backward; thus, the most fundamental aspect of cell cycle control is this regulation of entry and exit. The cell cycle is divided into four distinct phases:

- G_1 (gap 1),
- S (synthesis),
- G_2 (gap 2), and
- M (mitosis).

Phases G_1, S, and G_2 are known as interphase, during which chromosomes (the genetic material) are copied and the cell doubles in size. During the M phase, cell division occurs, leading to the formation of two identical cells. Surveillance checkpoints exist at the junctions of each phase to ensure that damaged DNA is not passed on to daughter cells. Abnormal cells may be corrected or, if that is not possible, removed through cell death pathways. In neoplastic tumors, the duration of the cell cycle is equal to or longer than that of normal cells. However, the proportion of cells in a tumor that have committed to the cell cycle and are in active cell division is much higher than that in normal tissue. This results in a net increase in cell number and the formation of a tumor.

Differentiation

Most mature normal cells are functionally and morphologically differentiated into a specialized cell type. During differentiation, a cell acquires functions that are different from those of the original cell. Differentiation is a normal process by which a less specialized cell develops to possess a distinct form and specialized function. Differentiation dramatically changes a cell's size, shape (morphology), and its responsiveness to extracellular signals. These specialized changes are largely the result of highly controlled modifications in gene expression specific to each differentiated cell type. Thus, cells can have very different physical characteristics despite having the exact same complement of human genes. *Morphology* refers to the science of structure and form without regard to function. Each cell type has a specific morphology and at least one specific function.

Surveillance of Cellular Replication and Growth

Normal cellular replication and growth requires precise, error-free interpretation of both extra- and intracellular cell signals. Cell signaling is a complex communication system that requires accurate communication pathways within the cell (intracellular signaling) and among cells (extracellular signaling). Intracellular signaling operates through multistep redundant pathways often initiated by extracellular signals from nearby or distant cells. Many factors can lead to dysregulated cellular signaling, including genetic mutations and aberrant protein expression or function. When a signaling mistake occurs in the cell cycle, a host of surveillance mechanisms are present to recognize and repair the error. If it cannot be repaired, the cell can be destroyed through a process known as *apoptosis* or programmed cell death. This error-recognition helps ensure accurate replication of daughter cells.

VARIATIONS AND CONTEXT

Despite the exquisite fidelity of cellular reproduction and growth, mistakes may occur at almost any point in the cell cycle. Surveillance mechanisms usually recognize and correct these errors or, if unable to do so, destroy the cells to avoid passing the errors to subsequent daughter cells. However, when a mistake goes undetected, a repair is ineffective, or an aberrant cell is not destroyed, mutations become fixed, leading to neoplasia and the formation of tumors. These tumors can be benign or malignant, and comparisons between these two categories of neoplasms are presented in Table 10.1.

TABLE 10.1 Comparison of Benign and Malignant Neoplasms

Characteristic	Benign	Malignant
Encapsulated	Usually	Rarely
Differentiated	Normally	Poorly
Metastasis	Absent	Capable
Recurrence	Rare	Possible
Vascularity	Slight	Moderate to marked
Mode of growth	Expansive	Infiltrative and expansive
Cell characteristics	Fairly normal; similar to parent cells	Cells abnormal, become more unlike parent cells

Adapted from Harding M, Kwong J, Roberts D, Hagler D, Reinisch C. *Lewis's medical–surgical nursing: Assessment and management of clinical problems, single volume.* (11th ed.). Mosby; 2020.

Benign Neoplasm

Benign neoplastic cells tend to retain most of the morphologic and functional characteristics of the normal cells from which they were derived but represent groups of abnormal cells with excessive growth. Benign neoplastic cells are capable of replication and mitosis, but they are not capable of metastasis (the spread to locations outside their site of origin). Examples of common benign neoplastic tissues include endometriosis, nevi, and hypertrophic scars.

Although benign tumors do not invade adjacent tissue or metastasize to distant organs, they can result in significant health consequences. A benign tumor can obstruct or mechanically press on body structures, resulting in pain, physiological dysfunction, or even death. For example, a benign brain tumor may compress brain structures, leading to neurologic symptoms and dysfunction. Other benign tumors, such as lipomas, may have more of a psychosocial effect when they are outwardly visible and, thus, affect the physical appearance of an individual.

Malignant Neoplasm

A malignant neoplasm is characterized by cells that have abnormal growth patterns, multiple abnormal functions, and the ability to metastasize to local or distant sites. These abnormal characteristics give the malignant cell advantages that allow it and its offspring to thrive and survive, even in unfavorable conditions. Malignant neoplastic cells arise from previously normal cells as a result of unrepaired errors in multiple cancer-causing genes. The identity of these genes varies from one cancer type to another, and in fact, they can vary even within a given type of cancer. All cancers, however, evolve to acquire a similar set of functional capabilities, referred to as the *eight hallmarks of cancer*, aided by two enabling characteristics (Table 10.2).[2] Acquisition of these eight individual capabilities depends on a multistep succession of mutations, eventually resulting in a progressive expansion of subclones, one or more of which will evolve into a tumor of increasing growth dominance. Tumors are much more than insulated masses of identical proliferating cancer cells. Rather, they are complex tissues composed of many distinct cell types (including nonmalignant "normal cells") that interact with one another and with the cancer cells. In this complex tumor microenvironment, cancer cells are able to recruit normal cells to serve as contributors to support their proliferation, invasion, and metastases. In fact, an important part of modern cancer therapy has been the development of antineoplastic agents that target these normal "helper cells" rather than the cancer cells themselves.[3] Because cancer cells are often resistant to single-agent treatments, new agents have been developed for use in combination to target each of these ten common capabilities of cancer cells and the associated enabling characteristics (see Table 10.2).

TABLE 10.2 Targeting the Hallmarks of Cancer and the Enabling Characteristics

Cancer cell phenotype[a]	Targeting agent
Sustaining proliferative growth signaling	Cyclin-dependent kinase inhibitors[b]
Evading growth suppressors	Epidermal growth factor inhibitors[b]
Resisting cell death	Programmed death receptor blocking antibodies[b]
Avoiding immune destruction	Immune activators of cytotoxic T cells[b]
Enabling replicative immortality	Telomerase inhibitors
Inducing angiogenesis	Inhibitors of vascular endothelial growth factor (VEGF) signaling[b]
Activating invasion and metastases	Inhibitors of hepatocyte growth factor (HGF)/c-Met[b]
Deregulating cellular energetics	Aerobic glycolysis inhibitors
Genome instability and mutation	Poly ADP-ribose polymerase inhibitors[b]
Tumor-promoting inflammation	Selective antiinflammatory drugs[b]

[a]The first eight phenotypes represent acquired functional capabilities of cancer cells that are necessary for tumor growth and progression. The last two phenotypes represent the enabling characteristics that help the cancer cell acquire these functional capabilities.
[b]A class of antineoplastic agents in which there is a drug with Food and Drug Administration approval.
Adapted from Hanahan D. (2022). Hallmarks of cancer. New dimensions. *Cancer Discovery, 12*(1), 31–46. doi:10.1158/2159-8290. CD-21-1059

CONSEQUENCES

Malignant tumors acquire characteristics that allow them to spread, invade, and destroy normal tissue. Like any other tissue, cancerous tumors require oxygen and nutrition to sustain their rapid growth. For this to happen, the tumor releases factors that encourage tumor neovascularization. This process, known as tumor angiogenesis, facilitates further growth and invasion. When neovascularization is not possible or is halted, cancer cells are able to reprogram their energy metabolism processes to allow for sustained and rapid growth under anaerobic conditions as well.[4] Regardless of the energy source, as the tumor increases in size and metastasizes, it acts like a parasite, robbing normal body tissues of nutrients and oxygen and destroying the invaded tissues. Unless treatment is successful, the result is fatigue, weight loss, pain, organ failure, and eventual death.

Although many cancers are curable, people often associate the disease with inevitable pain and death. The most common psychosocial consequences associated with a cancer diagnosis

are fear, stress, and anxiety. When a malignant tumor is first discovered, patients and their family members often experience tremendous stress during the diagnostic and staging process. Often, the fear of the unknown can be as anxiety provoking as the diagnosis itself. Some individuals cope with the stress through a mechanism of denial, whereas others become very proactive and are interested in every aspect of the diagnostic and treatment process. In instances in which a child is diagnosed with cancer, the entire family is affected. Parents often exhibit depression, stress, and anxiety, whereas children commonly experience fear, anger, guilt, and grief, often expressed through behavioral changes.[5]

In addition to fear and anxiety, changes in family dynamics are common. Financial challenges often occur because of medical expenses and reduced income associated with lost time at work, both for the patient and the caregivers. Changes in self-image and self-identity may result if patients experience a significant change in their physical appearance or their family role because of the disease process. This, in turn, can lead to alterations in interpersonal relationships and the development of mood disorders. The psychosocial effects of cancer are particularly pronounced for cancer survivors and their families when cancer recurs.[6]

RISK FACTORS

As of January 2022, there were over 18 million Americans living with a history of cancer. In the United States in 2022, an estimated 1,958,300 new cancer cases (excluding basal and squamous cell skin cancers) were diagnosed, and an estimated 609,800 patients died from their disease.[7] Cancer deaths have declined on average 1.8% per year over the past decade, yet cancer remains the second most common cause of death in the United States (21%), exceeded only by heart disease (23%). Among men, the three most common new cancer diagnoses are prostate, lung (or bronchus), and colon (or rectum). For women, the three most common sites are breast, lung (or bronchus), and colon (or rectum). Lung cancer is by far the most common cause of cancer deaths among both men and women, followed by breast cancer and colorectal cancer for women and prostate cancer and colorectal cancer for men. In contrast to the high number of cancer diagnoses in adults, an estimated 9919 children (ages 0 to 14 years) and 5280 adolescents (ages 15 to 19 years) were diagnosed with cancer in 2023 (fewer than 1% of all cancer diagnoses). Of these, an estimated 1040 children and 550 adolescents died from their disease. Leukemia (28%) and cancers affecting the brain or central nervous system (26%) are the most common childhood cancers. Since 1970, cancer deaths have declined by 84% in children and 75% in adolescents largely because of success in the treatment of leukemia. However, cancer remains the second leading cause of death in these age groups, exceeded only by accidents.

Populations at Risk

Cancer occurrence and outcomes vary considerably between racial and ethnic groups, largely because of long-standing inequalities in wealth that lead to differences in exposure to risk factors and obstacles to receiving healthcare services related to cancer prevention, early detection, and high-quality treatment. In addition, individuals who are racial and ethnic minorities tend to receive lower-quality healthcare than individuals who are White even when insurance status, age, severity of disease, and health status are comparable. In minority groups, communication barriers and provider assumptions can affect interactions between patients and physicians, which further contributes to miscommunication and the delivery of substandard care.

Individual Risk Factors

Age and Gender

Although it is not a modifiable risk factor, the risk for developing an invasive cancer increases significantly as a person ages. It is estimated that 80% of new cancer diagnoses occur among those ages 55 years or older. The lifetime risk of developing cancer is slightly higher for men (40.2%) than for women (38.5%), but the reason for this disparity is not understood.[7]

Smoking or Tobacco Use

At least 30% of all cancer-related deaths and 81% of all lung cancer deaths can be attributed to smoking. Smoking is a known risk factor for 15 different types of cancers. Nonsmokers exposed to environmental tobacco smoke are also at increased risk of lung cancer, and secondhand smoke is estimated to cause 3650 lung cancer deaths in the United States. Nontraditional tobacco products such as snuff, lozenges, and chewing tobacco are promoted as smoke-free alternatives, but these products are associated with increased risk of oral cavity, esophageal, and pancreatic cancers.

Infectious Agents

Approximately 3% of all cancer cases in the United States are attributable to infections. Bacteria and viruses known to cause cancer include the *Helicobacter pylori* bacteria (gastric cancer), hepatitis B and hepatitis C viruses (liver cancer), and human papillomavirus (cervical, oropharyngeal, and anal cancer). Vaccines are available to prevent hepatitis B and human papillomavirus infections and, thus, provide immediate opportunities for preventing cancers, especially in at-risk populations.[8]

Genetic Risk

Approximately 5% of all cancers result from an inherited genetic alteration that is associated with an increased risk of developing certain types of cancer. In some cases, a specific gene mutation results in an extraordinarily high risk of cancer, such as a *BRCA1* (Breast Cancer gene 1) gene mutation that confers a 70% lifetime risk of developing either breast or ovarian cancer. Fortunately, these types of mutations are rare in the population. Although approximately 20 other cancer syndromes are known (e.g., Lynch syndrome), more common are the generally unexplained genetic susceptibilities and familial tendencies that increase cancer risk in certain families. Likely, many familial cancers arise not exclusively from genetic makeup, but from the interplay between common gene variations and lifestyle and environmental risk factors. The development of breast cancer among first-degree relatives is an example.[9]

Radiation

There are two main types of radiation (ultraviolet and ionizing) exposure that are linked to an increased risk of developing certain types of cancer. Ionizing radiation includes medical radiation from tests used to both diagnose (x-rays and computed tomography scans) and treat (radiation therapy) disease, and it is responsible for an increased risk of developing leukemia, breast, and thyroid cancer. An equally important source of ionizing radiation is from radon gas, which is a natural decay product of uranium in the earth. Exposure to radon gas dramatically increases risk for lung cancer. Ultraviolet radiation from the sun is the main cause of melanoma and the ubiquitous nonmelanoma skin cancers (basal and squamous). Although the latter is highly curable, the obvious intervention to decrease risk of any skin cancer is to avoid sun exposure and to use protective measures.[10]

Carcinogens

Environmental carcinogens have been associated with the development of many types of cancer. Exposure to some carcinogens may occur as a result of lifestyle choices (e.g., smoking), but other carcinogens may be present as environmental pollutants in the air, water, soil, or food. Although the risk level per person for cancer death from exposure to environmental pollutants is thought to be quite low (accounting for only 6% of cancer deaths), the large number of people involuntarily exposed leads to a large population effect. Probably more significant are high levels of exposure to agents (e.g., asbestos, dioxins, tetrachloroethylene, and arsenic) that disproportionately increase risk in specific low-income occupations and in some poor and disenfranchised communities.[10]

Nutrition and Physical Activity

Diet, body weight, and activity levels are interrelated and act in complex ways to either promote or reduce the risk of cancer. More than 20% of all cancer cases are attributed to poor nutrition, a sedentary lifestyle, and excessive weight. It is difficult to absolutely define the effects of diet on cancer because an individual's diet typically includes both foods that may protect against cancer and foods that may increase the risk of cancer. However, a number of epidemiologic studies suggest that high intakes of fresh fruits and vegetables are associated with lower cancer rates. Obesity is associated with increased risk for both developing new cancers and cancer recurrence. Weight loss has been shown to reduce cancer risk, although the exact mechanism is not well understood. In addition to contributing to risk of developing cancer, these factors are also responsible for significant disability and death from other causes, such as heart disease, hypertension, stroke, diabetes, and arthritis.[11]

ASSESSMENT

Assessment involves the collection of data from the health history, a physical examination, and diagnostic studies. It is not the intention of this text to describe the process of assessment or to describe the specific findings of all problems associated with cellular reproduction and growth because these are highly variable based on the involved tissue, organ, or body system. However, on initial diagnosis, several presenting symptoms and clinical findings often serve as "red flags" that are unusual and worthy of further investigation. The nurse should have an awareness of the significance of these symptoms and findings.

History

Individuals are usually asymptomatic when neoplasms are early in their development. As the tumor grows, an individual may become aware of its physical presence or may notice symptoms caused by the tumor. The most common presenting complaints include discovery of a lump, mass, or lesion; the onset of new symptoms (e.g., unusual or unexplained bleeding, pain, cough, or fatigue); changes in appearance of a body part; or signs associated with alterations in major body functions (e.g., weight, mental status, swallowing, or elimination). Often, the presenting symptoms are vague, and the nurse should conduct a symptom analysis to collect as much information as possible. This includes questions regarding the duration of the symptom, its location, characteristics, aggravating and relieving factors, and treatments undertaken, if any. The responses to these questions also provide early information about the patient's coping skills or potential denial of the problem. A medical history, family history, and psychosocial history will provide additional information that may later prove useful (e.g., personal history of smoking or a family history of cancer).

Examination Findings

When a patient presents with a specific symptom that raises concern, the examination should be focused to learn more about the presenting problem. However, patients do not always experience symptoms and, thus, the nurse needs be aware of possible indicators of neoplastic growth when conducting the physical exam. Abnormal findings that may suggest the presence of a neoplasm include visible lesions, physical asymmetry, palpable masses, abnormal sounds, or the presence of blood (e.g., on pelvic exam or in a guaiac test for occult blood).

Diagnostic Tests

A diagnostic workup is indicated when a symptom, examination finding, or screening test suggests the presence of a tumor. The tests discussed here are those most commonly used in the detection and diagnosis of tumors.

Imaging

Imaging studies are used to define the size, location(s), and activity of tumors. The most common imaging tests used for the diagnostic process related to cellular regulation include radiographs (x-rays), computed tomography, radioisotope scans, and diagnostic mammography. Imaging studies that do not use radiation include magnetic resonance imaging and ultrasound.

Direct Visualization

Some tumors can be evaluated by insertion of a lighted scope into a lumen or body cavity (e.g., colonoscopy, endoscopy, or cystoscopy). These tests not only allow visualization of the tumor but also allow for tissue biopsy for pathologic analysis.

Laboratory Tests

Several laboratory tests are useful in the diagnostic process. Perhaps the two most useful tests are the complete blood count and the chemistry panel. Although these tests are not diagnostic in themselves (except in the case of some hematologic malignancies), they may provide information about the overall health of the patient or provide clues about the presence of neoplasm. For example, an undiagnosed malignancy might first be detected by unexplained anemia or changes in the white blood cells. A limited number of tumor markers (e.g., carcinoembryonic antigen and prostate-specific antigen) or cancer-specific genetic changes (e.g., Philadelphia chromosome) can be detected in blood samples that may help provide a diagnosis. If a certain type of cancer is suspected, specific studies may be ordered that would be helpful in determining risk, such as genetic tests for the *BRCA1* and *BRCA2* genes that are linked to breast cancer.

Pathology

Pathology is the study of the origin and course of disease and is the branch of medicine that deals with the laboratory examination of cells and tissues for diagnostic purposes. Pathologic evaluation of a tissue sample is the only definitive way to determine whether a tumor is malignant or benign. It may also provide information such as the tissue type (histology), the degree of differentiation (grade), the presence or absence of certain markers on the cell surface, and the presence or absence of genetic or molecular markers. In the era of precision medicine, cell surface, genetic, and molecular markers often guide treatment and provide targets for antineoplastic therapy.

Cytology is the microscopic study of cells obtained either by aspiration (a fine-needle biopsy) or from a smear, washing, or scraping. A surgical biopsy involves removal of larger amounts of tissue for pathologic review. An incisional biopsy removes just part of the tumor or affected tissue, whereas excisional biopsy removes the entire tumor or tissue for evaluation. The type of biopsy done is based on the type of tissue to be removed, its location, and the amount of tissue required to make a diagnosis. Different biopsy approaches include going through the skin (percutaneous), through a scope (endoscopic), or directly during surgery. Percutaneous and endoscopic biopsy procedures are often facilitated with stereotactic approaches that allow for exact positioning of the biopsy instruments directly at the site of the tumor.

Classification: Grading, Staging, and Risk

When a malignancy is identified, clinical staging is done as part of the diagnostic workup to define the extent or spread of the disease and to aid as a guide to treatment. Staging includes determining the size of the tumor, its location(s), and the presence or absence of metastasis. Grading of the tumor includes determining both the tissue origin of the malignancy and its histologic grade (i.e., the degree of differentiation). In some malignancies, prognostic scoring systems have been developed to determine risk of relapse, overall survival, and likely response to specific therapies.

BOX 10.1 Grading System of the American Joint Committee on Cancer

GX—Grade cannot be assessed
G1—Well differentiated (low grade)
G2—Moderately differentiated (intermediate grade)
G3—Poorly differentiated (high grade)
G4—Undifferentiated (high grade)

Adapted from Olawaiye A.B., Baker T.P., Washington M.K., Mutch D.G. (2021). The new (Version 9) American Joint Committee on Cancer tumor, node, metastasis staging for cervical cancer. *CA: A Cancer Journal for Clinicians, 71*(4), 287–298. https://doi.org/10.3322/caac.21663

Grading Cellular Differentiation

Grading is the measure of the degree of differentiation of a neoplasm. Some pathology grading systems apply only to malignant neoplasms, whereas others apply to benign neoplasms as well. The neoplastic grading system is a measure of a cell's *anaplasia* or how different it appears from its tissue of origin. A cancer cell that is well differentiated looks more like the normal cell from which it derived, whereas a poorly differentiated cell has little resemblance to the original normal cell and typically represents a more advanced and aggressive cancer. For solid tumors, different grading systems are used to classify the appearance of malignant cells, although the most common is that recommended by the American Joint Committee on Cancer on Cancer (Box 10.1).[12] Cancer-specific grading scales are also used for certain types of solid tumor malignancies, such as the Gleason score[13] (prostate cancer) and the Bloom-Richardson grading system[14] (breast cancer). For the myriad of complex hematologic malignancies, the World Health Organization has developed detailed classification systems for these neoplasms and leukemias.[15]

Clinical Staging and Risk

For all solid tumors, the TNM classification system is used to determine the stage of the disease and is essential for guiding treatment.[12] This system assesses the growth and spread of the tumor based on three factors: T, tumor size and invasiveness; N, the presence or absence of spread to regional lymph nodes; and M, the presence or absence of metastasis to distant organs (Table 10.3). Once the T, N, and M categories are determined, a stage from I to IV is assigned, with stage I representing early stage disease and stage IV representing the most advanced disease. The actual assignment of these stages is specific to the cancer type. Hematologic cancers (i.e., liquid tumors) cannot be staged using the TNM classification system, and each of these malignancies has its own unique staging system. These staging systems often incorporate disease- and patient-specific factors to assign risk scores that help guide treatment and predict overall survival. Unique genetic changes and molecular markers have been identified in many solid and liquid tumor types, and this information has been incorporated into the staging and prognostic systems specific to those cancers. These markers also provide valuable information to guide treatment as more targeted therapies are developed.

TABLE 10.3 TNM Classification System

Primary Tumor (T)[a]	
TX	Tumor cannot be measured.
T0	No evidence of primary tumor (tumor cannot be found).
Tis	Tumor *in situ,* meaning malignant cells only within superficial layer of tissue; no extension into deeper tissue.
T1, T2, T3, T4	Description of primary tumor based on size and/or invasion into nearby structures; the higher the T number, the larger the tumor and/or the more it has grown into nearby tissues.
Regional Lymph Nodes (N)[b]	
NX	Nearby lymph nodes cannot be evaluated.
N0	No evidence of cancer cells in regional lymph nodes.
N1, N2, N3	Description of size, location, and/or number of lymph nodes involved; the higher the N number, the more extensive the lymph node involvement.
Metastases (M)[c]	
MX	Metastases cannot be evaluated.
M0	No evidence of metastases can be found.
M1, M2, M3, M4	Description of extent of metastasis; the higher the M number, the more extensive the metastasis.

[a]Describes the primary (original) tumor based on size (measured in centimeters).
[b]Describes whether or not the cancer has spread into regional (nearby) lymph nodes.
[c]Describes whether or not the cancer has metastasized (spread) to other parts of the body.
Adapted from American Cancer Society. http://www.cancer.org.

CORE COMPETENCIES

Cellular Regulation

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to cellular regulation.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to malignant processes resulting from altered cellular regulation.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to cancer prevention, diagnosis, and treatment for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to cancer prevention and screening.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to managing risks that may lead to altered cellular regulation and the development of cancer.
- Demonstrate clinical judgement founded on broad knowledge of both normal and abnormal cellular regulation.

CLINICAL MANAGEMENT

Primary Prevention

Preventing cancer from occurring is the most definitive way to lessen the burden of the disease. Risk factors can be eliminated or reduced through behavior modification, modification of the environment, vaccination, or treatment of infections. Major risk reduction is possible through smoking cessation, avoiding excessive sun exposure, participating in regular physical activity, and eating a balanced diet.[16] Combined, these four risk factors account for nearly 60% of all cancers. Although it is not a common approach, another primary prevention strategy is prophylactic surgery for individuals at risk. For example, a woman with the *BRCA1* genetic marker has a 70% lifetime risk of developing breast or ovarian cancer, and, thus, she might elect to have a bilateral mastectomy and oophorectomy to prevent development of these two cancers.

Secondary Prevention (Screening)

The goal of secondary prevention is early disease detection so that prompt treatment can be initiated. Screening refers to the application of a test to a population that has no overt signs or symptoms of the disease in question in order to detect disease at a stage when treatment is more effective. Screening tests are not diagnostic tests, but rather they identify individuals who require further investigation to determine the presence or absence of disease. Whereas some screening tests may positively identify a malignancy (e.g., colonoscopy), others often only identify suspected problems (e.g., mammography). Individuals who a have positive screening test of any type need to be referred for a full diagnostic workup.

There are multiple types of cancer screening, and a discussion of each is beyond the scope of this text. Examples of common screening tests for cancer include mammography for breast cancer, prostate-specific antigen testing for prostate cancer, and colonoscopy and guaiac testing for occult blood in the stool for colon cancer. The US Preventive Services Task Force establishes evidence-based screening recommendations for the general population.[17] Because recommendations are based on the latest scientific evidence, screening recommendations periodically change, as noted most recently with breast, prostate and colon cancer screening.

Interventions

Interventions for neoplasia are addressed in terms of treatment goals, which include cure, control, and palliation. The interventions discussed here may be used in various sequences or combinations.

Surgery

Surgery is the oldest intervention for cancer treatment. In addition to primary treatment, surgical intervention is also used for diagnosis, staging, and cytoreduction (debulking). Surgery may also be used to prevent cancer, to relieve the symptoms of cancer, or to enhance functional and cosmetic outcomes. With the exception of surgery for nonmelanoma skin cancers, primary surgical resection is rarely curative, and it is frequently combined with other treatments to improve cure rates and increase disease-free intervals. Additional therapies done after surgery are called *adjuvant* therapy and may include any of the therapies outlined below. If therapies occur prior to the surgical procedure, they are considered *neoadjuvant* therapy.

Nursing care of patients undergoing surgical procedures for any aspect of cancer (prevention, cure, palliation, and reconstruction) includes patient education, pre- and postoperative care, infection prevention, pain management, and psychosocial care.[18]

Radiation Therapy

Radiation therapy is a local treatment for cancer and may be used anytime in the disease trajectory. It can take the form of either palliative or potentially curative treatment. Radiation is essentially a small packet of energy in the form of photons (e.g., x-rays and ultraviolet light) or particles (e.g., protons, neutrons, α-particles, and electrons) that is delivered directly to the site of the neoplasm. When these packets of energy penetrate the tissue, ionization induces direct biologic damage to the cells. Because these packets often pass through healthy tissue on their way to the neoplasm, damage to unaffected cells is an unintended consequence.[19] Radiation therapy may be delivered in several ways, the most common of which is external beam therapy using a linear accelerator. Another delivery technique, known as brachytherapy, delivers a high dose of radiation to a limited volume of tissue. Using this technique, short-range radiation sources are enclosed in a protective capsule and placed directly at the site of the tumor. Thus, the radiation affects only a very localized area and limits exposure of radiation to healthy tissues. The nursing management of patients receiving either type of radiation therapy largely involves patient education and the management of symptoms associated with the therapies.[20]

Chemotherapy

The word *chemotherapy* means treatment with chemicals, but the term has evolved over time to mean the systemic treatment of cancer (although there are a few instances when chemotherapy can be applied locally to treat cancers). The general goal of chemotherapy is to prevent cancer cells from multiplying, invading, and metastasizing to distant sites. Unlike surgery or radiation, which are local and regional treatments, systemic chemotherapy agents act at the site of the tumor and at distant sites where tumor cells may have already metastasized. The principle of chemotherapy is based on the phases of the cell cycle, and most chemotherapeutic drugs are classified according to the specific phase of the cell cycle in which they exert their cytotoxic effects.[21] The role of the nurse in cancer chemotherapy is vast, pivotal, and rewarding. Oncology-trained nurses are responsible for assessment and education of the patient, handling and administration of chemotherapeutic agents, management of side effects, and management of psychosocial issues. Before they can administer chemotherapy in the clinic, nurses must undergo specialized training and certification through the Oncology Nursing Society.[22]

Hormonal Therapy

Another effective form of cancer treatment involves the use of antihormonal agents to treat malignancies that are responsive to hormones, such as breast, prostate, and endometrial cancers. Current approaches use agents that are hormonal agonists or antagonists, depending on type of cancer and the nature of the disease process. Hormonal therapies were developed based on their ability to target and block specific receptors and their various associated feedback loops. Thus, these agents are considered the first form of targeted cancer therapy.[23]

Targeted Therapy

Targeted therapy is the most rapidly evolving and expanding class of anticancer agents because of its specificity for targeting the abnormal changes found in cancer cells while having little effect on normal cell. These agents act on both intra- and extracellular targets and are designed to interfere with molecules that are necessary for cancer growth, progression, and metastasis. This is in contrast to chemotherapy agents that act against all actively dividing cells. These agents take several forms but generally fall into the categories of antibodies, antibody-drug conjugates, chimeric antigen receptor T-cell therapies (CAR-T) or small molecule inhibitors (of which there are many different classes). Targeted therapies have been developed that interfere with cell signaling, cell growth and proliferation, interfere with tumor blood vessel formation, deliver toxic drugs directly to cancer cells, and stimulate the immune system to destroy cancer cells. More than 100 targeted therapies have been approved by the US Food and Drug Administration for use in the treatment of more than 20 types of cancers, and there are many more in development. They are the cornerstone of the treatment arm of precision medicine, a medical model that seeks to use high-resolution genetic information about a person's disease to prevent, diagnose, and precisely tailor treatment.[24]

Biologic Therapy

Biotherapy (also known as immunotherapy) refers to modulation of the immune response for a therapeutic goal. *Biotherapy* is a global term used to describe the use of biologic agents to activate the immune system (biologic response modifiers) and includes therapies that manipulate cells within immune system to recognize cancer cells. Many of these agents fall into the category of targeted therapy because they have very specific targets recognized by the immune system.[25] Within the scope of the biologic response modifiers is the broad class of drugs that are extracted or produced from biologic material. Such agents include colony-stimulating factors, monoclonal and bispecific monoclonal antibodies, checkpoint inhibitors, angiogenesis inhibitors, vaccines, and CAR-T. These agents often have side effects that are quite different from those of traditional chemotherapy agents. As with chemotherapy, nurses wishing to administer and manage the side effects of these novel agents must receive specialized training and certification through the Oncology Nursing Society.[22] Because of the unique nature of biotherapy, nurses play a significant role in patient education and psychosocial support. As with many of the targeted therapies, these agents can be quite expensive, and there are frequently economic issues for the patient receiving biotherapy.[26]

Bone Marrow and Hematopoietic Stem Cell Transplantation

Hematopoietic (blood-forming) pluripotent stem cells are found in the bone marrow and when given the proper signals, these cells mature and give rise to fully formed erythrocytes,

leukocytes, and platelets. Stem cells can be collected from the blood through a process called apheresis, or they may be harvested directly from multiple bone marrow biopsy samples. When these stem cells are infused into a patient, the procedure is called a stem cell or bone marrow transplant, with the nomenclature essentially reflecting the source of the stem cells. Regardless of the source, the principle of the treatment is to replace diseased hematopoietic cells with these highly specialized stem cells that will then give rise to the full spectrum of healthy hematopoietic cells. The transplant can be either autologous (by harvesting and using one's own stem cells) or allogeneic (whereby the stem cells come from a matched family donor or matched unrelated donor).[27] In the latter case, the new donor immune system provides surveillance to destroy the cancer cells. Stem cell transplantation is usually done for the purpose of cure or quality-of-life years gained. Patients undergoing transplantation can have many complex medical issues, and nurses working with these patients require very specialized training.

Symptom Management Resulting From Cancer and Cancer Treatment

Patients with an advanced cancer diagnosis or those undergoing cancer treatment experience multiple complications related to both the disease and its treatment. For these patients, nursing interventions are geared toward managing both the physical and the psychosocial aspects of these complications. Nurses can support the patient and family members by identifying coping mechanisms and resources. A presentation of all complications and adverse effects associated with the previously discussed treatment modalities is beyond the scope of this concept presentation, the most common and important complications and side effects are briefly presented in the following section.

INTERRELATED CONCEPTS

Cellular regulation is closely related to many of the concepts presented in this textbook. The interrelated concepts may be associated with the disease process, consequences of treatment, or both. The most important interrelated concepts are presented in Fig. 10.2, and they are briefly described here. Treatment options are discussed with patients and their families before a treatment plan is initiated. Engaging the patient and family in decision-making represents the cornerstone of **Person-Centered Care. Nutrition** is an important interrelated concept because many patients with cancer experience calorie and especially protein malnutrition. Cancer cells divert nutrients from normal cells to sustain their cellular growth and expansion. In addition, many patients undergoing cancer treatment lose weight as a result of reduced or lost appetite (anorexia), nausea, vomiting, stomatitis, diarrhea, or physical inability to eat as part of the disease process.[28] Compromised **Immunity** is a concern especially among patients with a hematologic malignancy and is a common side effect of the myelosuppressive effects of the disease and treatment. Although this is typically transient, patients are vulnerable to many opportunistic infections. Disease- or treatment-related immunodeficiency puts patients with cancer at significant risk for **Infection**. Moreover, because of their immunocompromised status, they may not exhibit the typical signs and symptoms of infection. This can be fatal if it results in a delay in recognizing and treating an infection. In fact, infection is a common cause of death for patients with cancer who are undergoing treatment.[29] **Pain** is a common symptom associated with cancer and is among the most feared. It may result directly from cancer-caused tissue destruction, or it may be treatment related. It is a complex symptom to manage because pain perception varies widely among patients. Unfortunately,

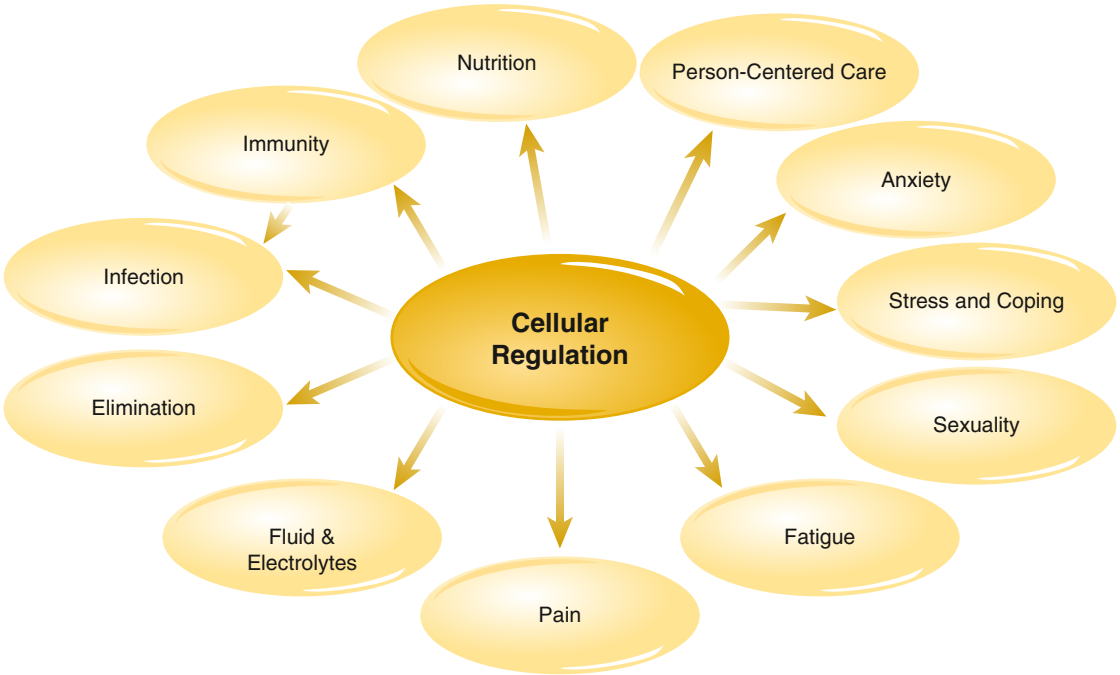

Fig. 10.2 Cellular Regulation and Interrelated Concepts.

pain is often underassessed and undertreated in patients with cancer.[30] **Fatigue** is a common symptom associated with cancer and its treatment. Fatigue in patients with cancer, known as *cancer-related fatigue,* is distinct and more debilitating than general fatigue. The unique and more debilitating symptoms associated with cancer-related fatigue are thought to be related to high levels of circulating inflammatory cytokines present in patients with cancer. A multitude of additional contributing factors may include side effects from medications, anemia, anorexia, weight loss, depression, and general organ dysfunction often associated with late-stage cancer.[31] Many patients with cancer experience an altered pattern of **Elimination**—the most common of which is diarrhea. Conversely, some chemotherapy agents and most pain medications (opioids) cause significant constipation. Bowel obstructions may occur as a result of the disease process, such as in the case of colorectal cancer, or urinary flow may be impaired by the presence of an enlarged malignant prostate. **Fluid and Electrolyte** imbalances can occur as a result of cancer or its treatment. Early in treatment, when disease burden is high, patients are at risk for tumor lysis syndrome manifested by elevated levels of uric acid, phosphate, and potassium. Other imbalances such as dehydration, hypercalcemia, and third spacing of fluids are common in patients with more advanced disease. **Anxiety**, **Stress and Coping**, and **Sexuality** have important and interrelated effects on patients with cancer because of psychosocial issues associated with their diagnosis and treatment.[32]

CLINICAL EXEMPLARS

There are many examples of abnormal cellular reproduction and growth and, in fact, there are more than 200 different types of cancer. Although it is beyond the scope of this text to describe every type of abnormality related to cellular regulation, some of the most common are presented (Box 10.2) and discussed here. Specific and detailed information related to each of these exemplars is readily available in nursing or medical textbooks and on reputable websites, such as those of the American Cancer Society (http://www.cancer.org) and the National Cancer Institute (http://www.cancer.gov).

BOX 10.2 EXEMPLARS OF ALTERED CELLULAR REGULATION

Benign Tumors
- Adenoma
- Benign Prostate Hypertrophy
- Benign Brain Tumor
- Fibroma
- Lipoma
- Meningioma
- Papilloma
- Rhabdomyoma

Malignant Tumors

Carcinoma and Adenocarcinoma (Originate From Skin, Glands, and Mucous Membrane Lining of Respiratory, Gastrointestinal, and Genitourinary Tracts)
- Breast cancer
- Prostate cancer
- Lung cancer
- Colon cancer

Sarcoma (Originates From Muscle/Bone/Connective Tissues)
- Chondrosarcoma
- Ewing sarcoma
- Fibrosarcoma
- Kaposi sarcoma
- Rhabdomyosarcoma
- Osteosarcoma

Lymphomas (Originates From Lymph System)
- Hodgkin lymphoma
- Non-Hodgkin lymphoma

Leukemia (Originates From Hematopoietic System)
- Chronic lymphocytic leukemia
- Chronic myeloid leukemia
- Acute lymphocytic leukemia[a]
- Acute myeloid leukemia[a]

[a] Condition is common among children.

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Featured Exemplars

Breast Cancer

Breast cancer, the second leading causes of cancer death among women,[33] originates in the tissues of the breast, and the most common subtype is ductal carcinoma, which begins in the lining of the milk ducts. Invasive breast cancer describes disease that has spread from where it began in the breast ducts into surrounding normal breast tissue. Lymphatic vessels in the breast drain to the axillary lymph nodes; thus, lymph nodes are often sampled to detect the presence of cancer cells. Risk factors include gender, age, family history, menstrual and pregnancy history, obesity, and hormone replacement therapy. Treatment for breast cancer is dependent on stage and includes surgery, radiation, hormonal, and targeted therapies.[34]

Lung Cancer

Lung cancer is the leading cause of cancer death among men and women.[33] It is characterized by uncontrolled cell growth of tissues of the lung. The main types of lung cancer are small-cell lung carcinoma and non–small-cell lung carcinoma, the latter of which comprises 85% of lung cancers. Subtypes of non–small-cell lung carcinoma include adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. Prognosis is generally quite poor because it is usually detected at later stages of the disease. Common symptoms include coughing (including coughing up blood), weight loss, shortness of breath, and chest pain. The majority (80%) of lung cancers are the result of long-term exposure to tobacco smoke.[35]

Prostate Cancer

Prostate cancer, a malignancy that originates in the prostate, usually grows slowly and initially remains confined to the prostate gland, where it rarely causes serious harm. In later stages, however, the cancer cells often spread to the bones and nearby lymph nodes. Because it grows slowly it may require minimal or no treatment. However, some subtypes can be quite aggressive and

will spread quickly if left unattended. Prostate cancer is the most common type of cancer in men; risk factors include older age, family history of the disease, and race. Approximately 99% of all cases of prostate cancer occur in men older than age 50 years.[36]

Acute Lymphocytic Leukemia

Acute lymphocytic leukemia is characterized by the overproduction and accumulation of malignant immature white blood cells known as blasts. As blasts accumulate in the bone marrow, they inhibit the production of normal cells such as red and white blood cells and platelets, resulting in symptoms such as fever, infection, shortness of breath, tachycardia, bleeding, and bruising. Blasts can leave the blood and bone marrow and infiltrate other organs. Acute lymphocytic leukemia is the most common type of cancer in children, and treatment generally results in the disease being cured. When it occurs in adults, treatment is not nearly as successful. Acute lymphocytic leukemia was one of the first cancers for which an effective chemotherapeutic treatment was developed.[37]

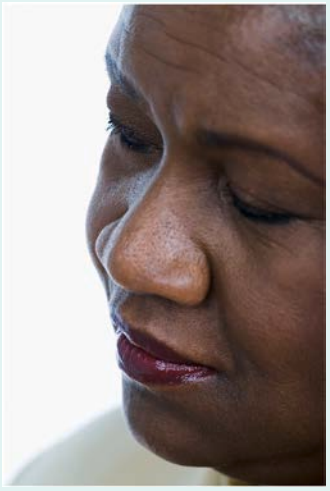
Fibroma

A fibroma is a benign tumor mostly composed of fibrous or connective tissue that can form anywhere in the body and that most commonly occurs in adults. Common types of fibroma include angiofibromas, dermatofibromas, ovarian fibromas, and plantar fibromas. Most are harmless, and treatment is not required unless there are disturbing symptoms or cosmetic concerns. Depending on the site and size of the fibroma, removal may be accomplished by a simple surgical procedure or by cryotherapy. Neurofibromas, associated with an autosomal dominant mutation in the *NF1* (neurofibromin 1) gene, are associated with extensive lesion formation and can result in symptoms ranging from physical disfiguration to cognitive disability.[38]

Lipoma

A lipoma is a benign tumor composed of adipose or body fat and is the most common benign soft tissue tumor. It occurs in approximately 1 in every 1000 people and usually in adults. Lipomas are generally slow growing, often arising over a period of months or years. Most are small, soft to the touch, movable, and painless. They can occur almost anywhere in the body, including in muscles and internal organs. In most cases, lipomas do not need to be treated, although they may be surgically removed if there is concern about location, they are causing pain, or they are affecting physical appearance.[39]

CASE STUDY



From Jeremy Woodhouse/Blend Images/Thinkstock.

Case Presentation

Katrina Wells, a 54-year-old female, works a sedentary job in telecommunications. She has been overweight most of her life and has never engaged in physical activity on a regular basis. Because of limited finances and limited healthcare coverage, Katrina seeks health care only when she is ill.

Through a community outreach program, Katrina met Lydia Robinson, a nurse who helped her gain access to basic preventive healthcare services. Acting on the advice of Lydia, Katrina agreed to have a screening mammogram. The radiologist who reviewed the mammography films discovered a small mass in the upper outer quadrant of Katrina's left breast. She was contacted by the radiologist and told she had an abnormal mammography result and that she needed to return to the imaging center for further workup. Katrina, not knowing what this meant, asked if she had cancer. She was told that cancer was a possibility but that further testing was needed to determine whether this was the case.

Katrina was upset by this information, and she was not sure she wanted any additional tests. Her mother had breast cancer, and Katrina watched her lose her breast and hair, in addition to becoming very sick from the medications. Lydia helped Katrina understand the need for the additional workup. During the next 4 weeks, Katrina underwent several tests as part of her diagnostic workup. Lydia helped Katrina by explaining the process and providing emotional support. The diagnostic mammogram and ultrasound examination of the breast revealed a 7.4-mm lesion, and a needle biopsy confirmed the diagnosis of breast cancer. The pathology showed that the lesion had low-risk features and that it would be responsive to hormonal therapy. Katrina was referred to a surgical and medical oncologist at the local cancer center for treatment.

An oncology clinical nurse specialist at the cancer center met with Katrina at her first oncology appointment to begin guiding her through the treatment process. Because of the small size of the lesion and the low-risk features, she was told she would not need chemotherapy. Her treatment would involve only surgery and radiation, followed by 5 to 10 years of hormonal therapy to decrease the risk of recurrence. She underwent a lumpectomy, followed by 5 weeks of radiation to the left breast and axillary region. After completing radiation therapy, she was prescribed an oral aromatase inhibitor, which she was to take daily for at least the next 5 years. She was to continue visiting the medical oncologist at the cancer center every 3 to 6 months during that time. At those visits, she would get a clinical breast exam and reinforcement about how to do a breast self-exam between visits. The staff at the cancer center also arranged for her to get yearly mammograms to screen for a new or recurrent breast cancer.

Case Analysis Questions

1. What were Katrina's risk factors for developing breast cancer?
2. How did Katrina's nurses help navigate her journey from diagnosis through treatment and follow-up?

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CONCEPT 11

Intracranial Regulation

James Mark Tanner

The brain is a highly complex organ that processes internal and external stimuli and controls body functions. As the largest component of the central nervous system, the brain lies within the cranium and is protected by the skull. The Intracranial Regulation (ICR) concept includes normal and abnormal processes of intracranial function. Nurses care for individuals experiencing a wide variety of ICR issues in both community and inpatient settings.

DEFINITION

The term *cranium* refers to the collective bone structure that encloses the brain—also known as the skull.[1] The prefix *intra-* refers to within. Thus, the term *intracranial* refers to the components that lie within the skull, which include the brain tissue and structures, the vascular system of the brain and its structures, and the cerebrospinal fluid.[2] *Regulation* is a term that refers to compliance and maintenance of balance. In the case of ICR, regulation refers to maintaining a balance to promote an environment that is conducive to optimal brain functioning. The concept of ICR includes anything that affects the contents of the cranium and affects the regulation of maintaining an optimally functioning brain. For the purpose of this concept presentation, ICR is defined as *mechanisms or conditions that impact intracranial processing and function.* Although the brain receives input from outside the cranium, specifically through the peripheral nervous system and the spinal cord component of the central nervous system, this concept does not include problems with the peripheral nervous system or spinal cord. This chapter focuses on conditions that specifically affect the contents of the cranium.

SCOPE

The scope of this concept ranges from optimal to impaired function (Fig. 11.1). Optimal ICR allows individuals to function normally. Impairment is caused by a number of factors including reduced blood flow to the brain, compromised neurotransmission, and damage to brain tissue. The resulting neurologic dysfunction can range from minimal to severe.

NORMAL PHYSIOLOGICAL PROCESS

The brain is the primary structure associated with ICR and is part of the central nervous system, serving as the primary control center for the body. At the cellular level, brain tissue is composed of neurons, which transmit information both within the brain and throughout the body, and neuroglia, which serve as support structures for neurons. Although there are neurons that are specialized for different functions, they all have the properties of being excitable (generating a nerve impulse), capable of conducting a nerve impulse, and capable of being able to cause a reaction based on the impulse that they conduct.

The three primary structures of a neuron are the dendrites, the cell body, and the axon (Fig. 11.2) Neurons direct signals from cell to cell using both electrical current and chemical messengers called neurotransmitters. This process starts when the neuron initiates an action potential that allows an electrical impulse to travel from the cell body of the neuron down the axon. At the terminal end of the neuron are synaptic knobs that release chemical neurotransmitters that cross the synapse to another cell (neuron, muscle cell, etc.). There, these neurotransmitters are received by dendrites, which then allow the

Fig. 11.1 Scope of Concept: Intracranial Regulation. *ICR,* intracranial regulation.

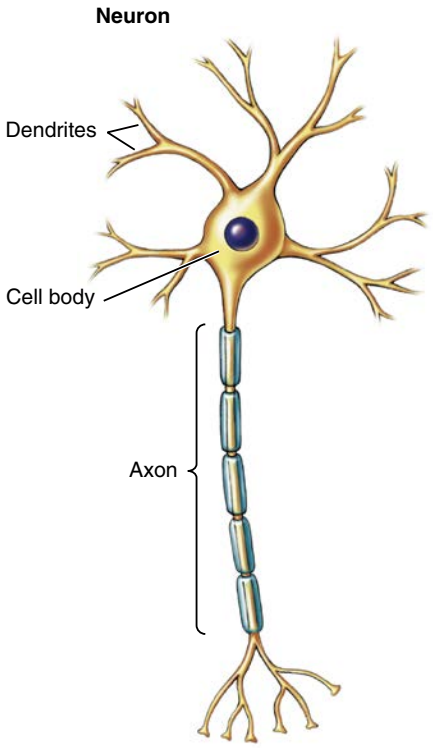

Fig. 11.2 Structure of a Neuron.

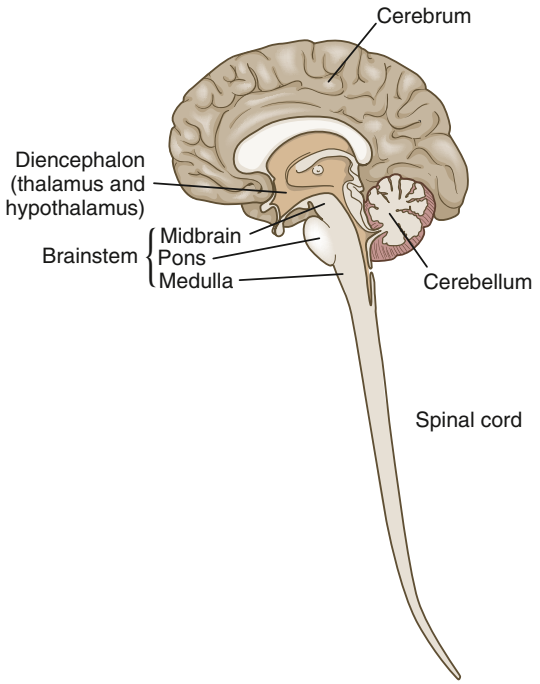

Fig. 11.3 Structures of the Brain. (Modified from Lewis, S. L., Bucher, L., Heitkemper, M. M., Harding, M. M., Kwong, J., & Roberts, D. (Eds.). (2017). Medical–surgical nursing: *Assessment and management of clinical problems* (10th ed.). St Louis: Elsevier.)

messengers generate another action potential in the receiving cell. This chain reaction allows information to pass from its origin to its destination. There are many different categories of neurotransmitters, and they can be either excitatory or inhibitory.[4]

Areas of the Brain

Anatomically, the brain is divided into four major areas: the cerebrum, the diencephalon, the cerebellum, and the brainstem (Fig. 11.3). The cerebrum is the largest part of the brain and is divided into the right and left cerebral hemispheres; the right and left parts of the brain are connected by the corpus collosum. Each hemisphere has four lobes: the frontal lobe, parietal lobe, temporal lobe, and occipital lobe. Collectively, cerebrum functions include thinking, reasoning, judgment, language, emotions, sensory perceptions, movement, and other higher functions. The diencephalon controls circadian rhythms, coordinates with the endocrine system, and relays information from the periphery to the proper areas in the brain for action to be taken. The limbic system, which sits between the diencephalon and the cerebrum, connects higher and lower brain functions, and is involved in the regulation of emotion, mood pleasure, and motivation. The cerebellum helps to control balance and posture, and the brainstem maintains normal autonomic function. Normal brain function involves interaction among these structures through a complex communication system. Table 11.1 presents some general functions of these structures.

Cerebral Blood Flow

Brain function depends on a consistent supply of blood delivering oxygen and nutrients. Cardiac function and a sufficient volume of blood is required for adequate perfusion. The level of oxygen in the blood is dependent on gas exchange in the lungs and hemoglobin capacity. Likewise, because carbohydrates are the main source of fuel for the brain, optimal ICR is dependent on blood glucose levels. Cerebral blood flow is normally maintained at a relatively constant rate by intrinsic cerebral mechanisms referred to as autoregulation. Autoregulation adjusts regional cerebral blood flow in response to the brain's metabolic demands by changing the diameter of cerebral blood vessels. Cerebral arterial walls are thinner than those in systemic circulation because of a lack of smooth muscle and a decreased thickness of the tunica media. They also do not have the ability to develop collateral circulation in response to ischemia. Autoregulation allows cerebral circulation to deliver a constant supply of blood despite wide fluctuations in systemic blood pressure and prioritizes adequate perfusion of the brain over other structures in the body.

Protection

Because the brain is delicate and because neurons cannot be repaired, four structures form an elaborate protective system: the skull, meninges, cerebrospinal fluid, and the blood-brain barrier.

Skull

The brain sits within the skull, which is sometimes referred to as the cranial vault. The skull is composed of multiple bones that act as a rigid, noncompliant protective covering of the brain. Within the skull are three components: brain tissue (80%), blood (10%), and cerebrospinal fluid (10%); intracranial pressure (ICP) is the sum of the pressure exerted by these three volumes in the skull. In adults, ICP is normally ≤15 mm Hg. Because the

TABLE 11.1 Structures of the Brain and General Functions

Brain structure	Description	Functions
Cerebrum	Largest brain structure located at the top; divided into two hemispheres (right and left) and four lobes (frontal, parietal, temporal, occipital)	Thinking, consciousness, sensory perception, movement, emotions, memory
Cerebellum	Located under occipital lobe of the cerebrum	Balance, muscle coordination, posture
Diencephalon	Located between the cerebrum and the midbrain; consists of two structures—the thalamus and hypothalamus	Sensory relay, emotions, alerting mechanism (thalamus); regulation of body temperature, fluid balance, sleep, appetite (hypothalamus)
Brainstem	Located at the base of the brain; consists of the medulla oblongata, pons, and midbrain	Conduction pathway between brain and spinal cord for movement, cardiac, respiratory, and vasomotor control; conduction pathway for visual and auditory impulses

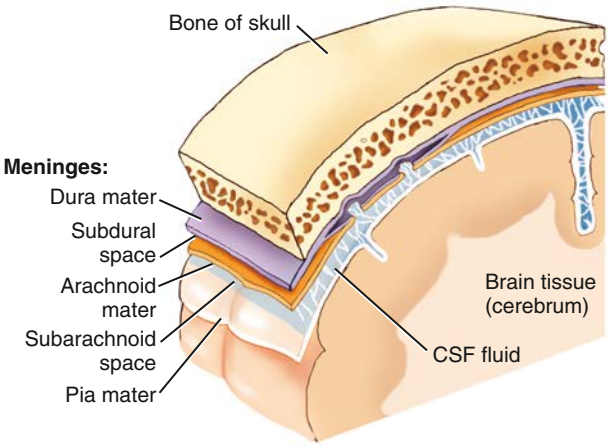

Fig. 11.4 Meninges: Dura Mater, Arachnoid Layer, and Pia Mater. *CSF*, cerebrospinal fluid. (From Shiland, B. J. (2019) *Mastering healthcare terminology* (6th ed.). St. Louis: Elsevier.)

skull is a rigid structure that cannot expand, a change in one of these three components necessitates a change in another. This interrelationship of volume and compliance of the three cranial components is known as the Monro-Kellie doctrine.[3] ICP and its influence on normal function will be revisited later in the chapter.

Meninges

Three layers of a tough protective membrane surround the brain and spinal cord: dura mater, arachnoid mater, and pia mater (Fig. 11.4). The outermost layer is the dura mater, which is a thick tough connective tissue that sits beneath the skull. The arachnoid mater is the middle layer. The space between the dura mater and arachnoid mater is referred to as the *subdural space*. The pia mater is the innermost layer and is a very thin membrane that lays over the brain tissue. It contains a network of blood vessels that supply the brain. The space between the arachnoid mater and pia mater and is referred to as the *subarachnoid space*, which contains cerebrospinal fluid. The spaces are important to remember because problems are frequently referred to in relation to the meningeal layer location—subarachnoid hemorrhage or subdural hematoma as examples.

Cerebrospinal Fluid

Cerebrospinal fluid is a clear fluid that circulates within the subarachnoid space of the brain and serves several functions. One such function is shock absorption. Cerebrospinal fluid cushions and protects the brain from injury when the skull is struck. It also supports the brain and other structures of the central nervous system by providing nutrients, removing waste, and maintaining homeostasis of the interstitial fluid, which is needed for optimal function of the neurons.[5] Cerebrospinal fluid is produced at a rate of approximately 20 mL/hour, circulates within the subarachnoid space, and then is absorbed into the venous system. Cerebrospinal fluid analysis provides useful diagnostic information related to certain nervous system conditions (see Diagnostic Tests under Assessment).

Blood-Brain Barrier

Between the arterial and venous networks of the brain is a unique capillary system called the blood-brain barrier, which consists of a tight layer of endothelial cells. This restrictive barrier makes it difficult for neurotoxic substances to pass into the brain.[2] This barrier may become compromised secondary to decreased perfusion, trauma, or other processes.

Age-Related Differences

The brain undergoes significant development during infancy and childhood. At birth, brain function is primarily limited to primitive reflexes and is sufficiently developed to sustain life. Extensive development occurs thereafter during the first few years, not only in size but also in function. Throughout childhood, a child's growth and development are influenced by evolving cognitive, emotional, and motor functions within the brain. Cranial sutures are ossified by age 12 years, with no expansion of the skull after age 5 years.[6] Before the sutures are entirely closed, there is some room for expansion in the case of cerebral edema and increasing ICP.

Aging is associated with a reduction in brain size, weight, and number of neurons. Atrophy of neuronal dendrites causes a slowing of neurotransmission and neural processes. These changes, however, are not directly associated with mental function, and cognitive abilities remain intact in the absence of disease, although cognitive function is enhanced with continued stimulation.

VARIATIONS AND CONTEXT

There are several categories that describe impairment or dysfunction associated with ICR. These include problems associated with perfusion, neurotransmission, glucose regulation, and structural damage. These categories are briefly described, and

the pathologic consequences of these impairments are detailed. All these impairments can occur across the lifespan, although some are more prevalent in particular age groups.

Impaired Perfusion of Oxygenated Blood

For the brain to function, there must be a consistent supply of blood delivering oxygen and nutrients. Impairment in blood flow, reduced oxygenation of the blood, or reduced blood glucose can lead to significant dysfunction. Disruption of cerebral perfusion leads to a wide variety of ICR problems depending on the area of the brain that is affected and the length of time before perfusion is restored. Intracerebral perfusion can be disrupted in many ways, such as by internal blockage of a vessel, intracranial hemorrhage, severe hypotension (and subsequent decrease in cardiac output), loss of vessel integrity, or excessive external pressure on a vessel that exceeds perfusion pressure (from cerebral edema). Common examples of impaired perfusion are:

- blockage from a thrombus or embolus impairs circulation distal to the occluded area leading to ischemic stroke;
- ruptured vessel causes intracranial hemorrhage and reduce perfusion, causing to a hemorrhagic stroke;
- traumatic brain injury causes intracranial hemorrhage (such as a subdural hematoma or subarachnoid hemorrhage).

Compromised Neurotransmission

Optimal functioning of the brain is dependent on the transmission of nerve impulses across neuronal synapses by neurotransmitters. Normal transmission requires fully functioning neurons, nerves, and neurotransmitters. Presynaptic neurons release neurotransmitters that travel to postsynaptic neurons. Neurotransmitters can be either excitatory or inhibitory. If any elements within this process is disrupted, significant issues result. Degenerative diseases (see Pathology) can disrupt brain functioning through the loss of neurons, which can reduce the amount of neurotransmitter present and the number of neurons that can receive neurotransmitters. The concentration of the neurotransmitter acetylcholine is reduced in Alzheimer disease secondary to the destruction of acetylcholine-secreting neurons. Neurotransmitters can be affected by drugs and toxins, which can modify their function or block their attachment to receptor sites on the postsynaptic membrane. For example, heroin binds to presynaptic endorphin receptors and reduces pain by blocking the release of the neurotransmitter that causes pain.[2] Seizures are aberrant neuronal activity that can manifest clinically as disrupted motor control, sensory perception, behavior, and/or autonomic function.

Glucose Regulation

Because the brain cannot store glucose, a constant supply is needed to maintain optimal functioning. Areas of the brain that are particularly sensitive to hypoglycemia are the cerebral cortex, hippocampus, and cerebellum. Prolonged hypoglycemia may cause widespread neuronal injury. Children, who have smaller glycogen stores, are particularly susceptible to hypoglycemia, which can adversely affect brain tissue. Hyperglycemia (blood glucose level >126 mg/dL) can also cause problems by augmenting brain injury in acute stroke. Some of the deleterious effects of hyperglycemia are increased tissue acidosis from anaerobic metabolism, free radical generation, and increased blood-brain barrier permeability. The American Heart Association/American Stroke Association guidelines for acute ischemic stroke recommend treatment for hyperglycemia to achieve serum glucose concentrations in the range of 140 to 180 mg/dL.[7]

Pathology

There are many pathologic states that disrupt intracranial functioning and regulation. Pathology of the brain can take many forms, such as brain tumors, degenerative diseases, and inflammatory conditions.

A brain tumor is a growth of abnormal cells within the brain. Tumors can occur in any part of the brain and can be benign or malignant. Most malignant tumors are the result of metastasis from another primary site outside the brains. Regardless of the type or location, brain tumors disrupt ICR by damaging brain tissue and exerting pressure on surrounding brain structures. The clinical manifestations depend on the size and location of the tumor.

Many degenerative diseases of the brain are clinical exemplars of the ICR concept. Possible causes of degenerative diseases include genetics, exposure to chemicals or other hazardous agents, and autoimmune disease among others. Alzheimer disease is a degenerative process that results in the loss of neurons primarily in the gray matter of the brain. In contrast, Parkinson disease is a result of damage to the basal ganglia, which results in decreased production of the neurotransmitter dopamine, which results in abnormal movements. Although these degenerative diseases affect different portions of the brain, each has the same end result, which is the disruption of normal ICR and brain function.

Common inflammatory conditions of the brain include abscesses, meningitis, and encephalitis. Although the etiology varies with each condition, the result is disrupted cerebral function and regulation through either direct damage to the neurons or indirect damage from inflammatory processes.

CONSEQUENCES

Regardless of the specific condition or cause, when there is impaired perfusion, compromised nerve impulses, altered glucose regulation, or structural damage, significant pathophysiologic consequences can occur. Because neurons are not easily repaired, neuronal dysfunction or death typically leads to long-term impairment. The extent of the impairment depends on the area of the brain affected and whether the damage results in full destruction of the neurons or not.

Underlying impairment or dysfunction leads to one or more consequences, which are often interrelated. Some of the most common include altered mental status or loss of consciousness (as a result of poor perfusion, hypoxia, inadequate glucose, or pathologies), impaired or lost cognitive function (as a result of inadequate glucose or pathologies), and altered or lost purposeful motor activity (for example, as a result of damage to tissues or compromised neurotransmission; see Concept 24, Mobility, and Concept 32, Cognition, for further information). In addition to these consequences, three additional consequences are worth mentioning in greater detail.

Cerebral Edema

Cerebral or brain parenchymal edema occurs for many reasons. Box 11.1 shows common causes of cerebral edema. It is a symptom that is common to many ICR conditions. Cerebral edema may be classified as vasogenic, cytotoxic, or interstitial. Regardless of the classification or origin of cerebral edema, the result is an increase in brain size that will negatively affect perfusion and oxygenation to the brain. Signs and symptoms will become evident to varying degrees based on the location and amount of cerebral edema.

Increased Intracranial Pressure

Elevated ICP is a potentially devastating complication of neurologic injury caused by many different conditions. Pathologic intracranial hypertension is evident at sustained pressures ≥20 mm Hg. Several conditions may cause increased ICP, such as traumatic brain injury, ruptured aneurysm, central nervous system infections, hydrocephalus, and brain tumors. Symptoms of increased ICP include headache, decreased level of consciousness, and vomiting. Signs may include cranial nerve VI palsies, papilledema, and periorbital bruising; a late sign is Cushing triad (see Increased Intracranial Pressure in the Assessment section).[2] The untoward consequence of increased ICP is impaired perfusion (see Measurement of Cerebral Perfusion Pressure), which exacerbates brain injury. If the ICP is severe and progressive the brain can herniate through specific foramina of the skull, leading to death.

BOX 11.1 CAUSES OF CEREBRAL EDEMA

Mass Lesions
- Brain abscess
- Brain tumor (primary or metastatic)
- Hematoma (intracerebral, subdural, epidural)
- Hemorrhage (intracerebral, cerebellar, brainstem)

Head Injuries and Brain Surgery
- Contusion
- Hemorrhage
- Posttraumatic brain swelling

Cerebral Infection
- Meningitis
- Encephalitis

Vascular Insult
- Anoxic and ischemic episodes
- Cerebral infarction (thrombotic or embolic)
- Venous sinus thrombosis

Toxic or Metabolic Encephalopathic Conditions
- Lead or arsenic intoxication
- Hepatic encephalopathy
- Uremia

Electrolyte Imbalance
- Hyponatremia

From Lewis, S. L., Bucher, L., Heitkemper, M. M., Harding, M. M., Kwong, J., & Roberts, D. (Eds.). (2017). *Medical–surgical nursing: Assessment and management of clinical problems* (10th ed.). St Louis: Elsevier.

Neuronal Injury or Death

All cells require oxygen blood for survival. A consequence of impaired perfusion of oxygenated blood is ischemia (injury) or infarction (death) to neurons. Three variables that influence the severity of this consequence include (1) the underlying cause of the impaired perfusion, (2) the amount of time that perfusion is impaired, and (3) the area of the brain where the ischemia or infarction occurs. If the underlying perfusion impairment is quickly identified and treated, neuronal injury may be limited, with minimal long-term consequences. However, prolonged impairment leads to infraction of the neurons and is associated with more extensive consequences. Early manifestations of cerebral hypoxia may be mild (such as sleepiness or a headache) and can progress quickly. Progressive manifestations also depend on the area of the brain that is affected; manifestations can include loss of balance, loss of movement, and cognitive changes. If a large area of the brain is affected, consequences tend to be more severe.

RISK FACTORS

Populations at Risk

All populations are potentially at risk for problems with ICR because there is such a wide variety of conditions included in this concept. Depending on the condition, some populations are at a higher risk. ICR problems related to degenerative pathology have a higher incidence in the older adult population. Injury-related ICR problems are more commonly seen in the adolescent and young adult age groups. The leading cause of traumatic brain injury is falls, which disproportionately affect the youngest and oldest age groups. Being struck by or against an object is the second leading cause of traumatic brain injury. Among all age groups, motor vehicle crashes are the third overall leading cause of traumatic brain injury.[8]

Individual Risk Factors

Individual risk factors are dependent on the cause of injury or pathology. For example, the risk factors for stroke include advanced age, hypertension, diabetes, smoking, obesity, use of anticoagulants, dysrhythmias, and cardiovascular disease. Congenital defects, such as hydrocephalus, arteriovenous malformation, and neural tube defects may affect the young or may go undiscovered until later in life. Some degenerative pathologic conditions have a strong genetic component which put certain individuals at higher risk. Brain tumors may also have genetic or environmental risk factors.

ASSESSMENT

History

A thorough history should be solicited from the patient or a family member if the patient is unable to provide information. The history should focus on the onset of illness or injury and anything that may be related to ICR. The patient presentation

will help direct the nurse to the most relevant areas of inquiry. Information in a history that provides data about intracranial function can relate to multiple systems. Asking pertinent questions will provide clues to the examiner of ICR problems and will help focus the physical examination. Symptoms that may point to problems associated with ICR should be explored and include:

- Numbness, paralysis, tingling, neuralgia
- Loss of consciousness, dizziness, fainting, confusion
- Changes in recent or remote memory
- Changes in vision, hearing, balance, gait
- Aphasia (expressive and/or receptive)
- Chewing/swallowing problems
- Muscle weakness (unilateral or bilateral)
- Loss of bowel or urinary control
- Onset of unexplained tremors or other motion disturbances
- Unexplained, severe headache
- Vomiting
- Symptom onset
- Convulsions
- History of head injury

Examination Findings

Objective examination findings that convey neurologic status are found during a physical examination. Specific signs of dysfunction vary depending on the ICR problem. When assessing an older adult or an individual with underlying cognitive issues, it is important to distinguish between the expected changes and changes potentially related to an ICR problem that could improve with appropriate treatment. Findings common to most conditions are a change in mental status and motor function. Some of the more common examination techniques and tools are discussed next, but this is not an all-inclusive list.

Mental Status

A complete mental status examination includes assessment of the individual's emotional responses, mood, cognitive functioning, and personality. Depending on the patient's presenting condition, the nurse will decide which components of the exam are relevant.[9] At a minimum, the individual's orientation to person, place and time should be assessed so that the nurse can know if further evaluation is needed. If it is not practical or necessary to do a complete mental status exam, the Mini-Mental Status Examination is an option, which is a simplified scored form of the cognitive portion of the mental status examination. It consists of 11 questions and takes 5 to 10 minutes to administer.[10]

Cognitive functioning should be intact in the healthy elderly client, although some changes may occur as individuals grow older.[9] When assessing an elderly patient, it is essential to determine the patient's baseline neurologic functioning in order to establish if there are significant changes.

Glasgow Coma Scale

The Glasgow Coma Scale (GCS) is used to give a standardized numeric score of the neurologic patient assessment. This is a widely used measurement tool that consists of three components: eye opening, verbal response, and motor response. Although this is an objective measurement tool, there is room for subjective interpretation of assessment findings. To minimize subjectivity and facilitate consistency, when transferring care of a patient, nurses should assess the GCS score together and agree on the value. Changes in the GCS score will help determine treatment methods and priorities. Table 11.2 describes the components of the GCS.

TABLE 11.2 Glasgow Coma Scale

Appropriate stimulus	Response	Score
Eyes Open	Spontaneous response	4
• Approach to bedside	Opening of eyes to name or command	3
• Verbal command	Lack of opening of eyes to previous stimuli but opening to pain	2
• Pain	Lack of opening of eyes to any stimulus	1
	Untestable[a]	U
Best Verbal Response	Appropriate orientation, conversant; correct identification of self, place, year, and month	5
• Verbal questioning with maximum arousal	Confusion; conversant, but disorientation in one or more spheres	4
	Inappropriate or disorganized use of words (e.g., cursing), lack of sustained conversation	3
	Incomprehensible words, sounds (e.g., moaning)	2
	Lack of sound, even with painful stimuli	1
	Untestable[a]	U
Best Motor Response	Obedience of command	6
• Verbal command (e.g., "raise your arm, hold up two fingers")	Localization of pain, lack of obedience but presence of attempts to remove offending stimulus	5
	Flexion withdrawal,[a] flexion of arm in response to pain without abnormal flexion posture	4
• Pain (pressure on proximal nail bed)	Abnormal flexion, flexing of arm at elbow and pronation, making a fist	3
	Abnormal extension, extension of arm at elbow usually with abduction and internal rotation of arm at shoulder	2
	Lack of response	1
	Untestable[a]	U

[a]Added to the original scale by some centers.
Modified from Lewis, S. L., Bucher, L., Heitkemper, M. M., Harding, M. M., Kwong, J., & Roberts, D. (Eds.). (2017). *Medical–surgical nursing: Assessment and management of clinical problems* (10th ed.). St Louis: Elsevier.

Cranial Nerves

As the name implies, the cranial nerves originate in the cranium; therefore assessment of the cranial nerves should be included in a thorough neurologic assessment. Abnormal findings will help locate the affected area of the brain. Further information about cranial nerve assessment can be found in nursing assessment textbooks.

Assessing Intracranial Pressure

Elevated ICP is a potentially devastating complication of neurologic injury caused by many different conditions. Pathologic intracranial hypertension is evident at sustained pressures greater than or equal to 20 mm Hg. The earliest sign of increased ICP is a change in level of consciousness. Another early sign is headache. Headache characteristics associated with increased ICP include nocturnal awakening, pain worsened by coughing or defecation, recurrent and localized pain, and progressive increase in frequency or severity of pain. Vomiting, usually not preceded by nausea, is often a nonspecific sign of increased ICP.[11] For children, the clinical manifestations of elevated ICP vary by the age of the child and whether the rise in pressure is gradual or acute. Nausea and vomiting are common presenting symptoms at any age.[12]

Cushing triad is an ominous late sign of increased ICP and an indication of impending herniation. The triad consists of hypertension (with widened pulse pressure), bradycardia, and irregular respirations. Pupil and vision changes may become apparent as edema impinges on cranial nerves II, III, IV, and/or VI.[9] As ICP continues to increase without intervention, there will be a loss of consciousness and possible cardiovascular collapse.

ICP is measured using a catheter placed in the intraventricular, intraparenchymal, subarachnoid, or epidural parts of the cranium (Fig. 11.5). The most common placement is in the lateral ventricle. Patients must be in an intensive care environment for this type of monitoring. ICP is frequently monitored in trauma patients with a closed head injury. Other indications for ICP monitoring include stroke, intracerebral hemorrhage, hydrocephalus, and subarachnoid hemorrhage. Guidelines for management of severe head injury recommend ICP monitoring for patients who are comatose, have sustained a head injury, have a GCS score from 3 to 8, and have an abnormal computed tomography (CT) scan. Treatment for ICP greater than 22 mm Hg is recommended because values greater than this level are associated with increased mortality.[11]

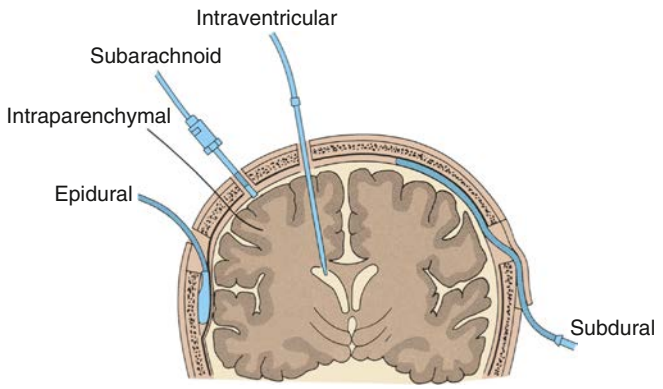

Fig. 11.5 Coronal Section of Brain Showing Potential Sites for Placement of Intracranial Pressure Monitoring Devices. (Modified from Lewis, S. L., Bucher, L., Heitkemper, M. M., Harding, M. M., Kwong, J., & Roberts, D. (Eds.). (2017). *Medical–surgical nursing: Assessment and management of clinical problems* (10th ed.). St Louis: Elsevier.)

Measurement of Cerebral Perfusion Pressure

Cerebral perfusion pressure is the pressure needed to maintain perfusion to the brain. It can be calculated by subtracting the ICP from the mean arterial pressure. A cerebral perfusion pressure less than 60 mm Hg is considered low. When cerebral perfusion pressure is low, brain tissue can become ischemic and then eventually necrotic if perfusion is not restored, disrupting autoregulation.[3] Cerebral perfusion pressure should be kept between 60 and 70 mm Hg in patients with elevated ICP to avoid ischemic injury. Cerebral perfusion pressure greater than 70 mm Hg should be avoided because of an increased risk for adult respiratory failure.[10]

Normal cerebral perfusion pressure range for children is not well established, but it is likely lower than that of adults because systolic blood pressure is lower in children. Appropriate cerebral perfusion pressure values are likely 40 to 60 mm Hg.[12]

National Institutes of Health Stroke Scale

The National Institutes of Health Stroke Scale (NIHSS) is an example of one type of specific tool for nurses to use when assessing a patient after stroke. This scale, composed of 11 items, has been widely used and validated. The NIHSS scores upon admission have been correlated with stroke outcome, and use of this assessment tool is recommended for all patients with suspected stroke.[13]

Diagnostic Tests

When an ICR problem is suspected, time is of the essence. Diagnostic tests that can quickly give the most pertinent information are recommended initially.

Neuroimaging Studies

Imaging studies are essential to obtain in patients presenting with sudden neurologic deterioration, and they may also be used with nonemergent conditions such as suspected brain tumor. A noncontrast CT or magnetic resonance imaging (MRI) scan should be performed as soon as possible to determine the origin of a neurologic injury. Current guidelines recommend a head CT for all patients with traumatic brain injuries with a GCS of 14 or lower because this test can detect skull fractures, intracranial bleeding, and cerebral edema.[11] Advanced CT and MRI technologies, such as magnetic resonance angiography and positron emission tomography, can distinguish between brain tissue that is irreversibly infarcted and that which is potentially salvageable, which will help when deciding appropriate treatment.

Skull Radiograph

Depending on the mechanism of action and patient presentation, a skull x-ray may be ordered to detect fractures, bone erosion, calcification, and/or abnormal vasculature.

Electroencephalogram

An electroencephalogram (EEG) measures and records the brain's electrical activity through multiple electrodes placed on the scalp. Video EEG monitoring refers to continuous EEG monitoring over a prolonged period while simultaneously recording the patient's movements and activity. This monitoring combination is useful in diagnosing and localizing the area of seizure origin. EEG is also helpful in identifying psychogenic nonepileptic seizures. The origin of these seizures may be associated with psychological conditions or other physical problems, but they are not caused by electrical activity in the brain.[14]

Brain Biopsy

To determine the type and stage of a brain tumor, a biopsy is performed, usually during a surgical procedure. Preliminary histologic type can usually be determined quickly in the operating room; then, the tumor is sent to pathology for complete analysis and final determination.

Lumbar Puncture

A lumbar puncture (spinal tap) is done to obtain a sample of cerebral spinal fluid and may be indicated when infection is suspected. A lumbar puncture should be deferred until after the head CT scan if intracranial hypertension is suspected because brain herniation may be precipitated by increasing the pressure gradient between the cranial vault and the spinal cord.

Laboratory Tests

Laboratory tests are not often related directly to issues with ICR but are used as part of the larger picture when assessing a patient. A complete blood count assesses the number of red blood cells available to adequately supply oxygen to the brain and also will show if there is an infectious process occurring in the body. A chemistry panel can help demonstrate levels of key electrolytes, such as sodium, that play an important role in proper transmission of nerve impulses. Genetic testing can also be done to assess risk factors for certain tumors or degenerative diseases.

CORE COMPETENCIES

Intracranial Regulation

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to intracranial regulation.
- Perform a clinically relevant assessment, recognizing actual or potential health problems related to intracranial regulation.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to intracranial regulation for individuals, communities, or populations.
- Implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to intracranial regulation.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to intracranial regulation.
- Demonstrate clinical judgment founded on broad knowledge of intracranial regulation.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention strategies are intended to maintain optimal health and prevent injury or disease. This applies to ICR in many ways. Leading a healthy lifestyle, which includes not smoking, maintaining a healthy weight, controlling blood pressure, managing dysrhythmias, and exercising, can decrease the risk of vascular disease affecting the cerebral arteries. This is linked to stroke risk reduction. Injury prevention measures such as proper use of seat belts and/or helmets, knowledge of firearm safety, and participation in violence prevention programs reduce the risk of traumatic brain injury. Healthy People 2030[15] has one specific objective to reduce fatal traumatic brain injuries.

Secondary Prevention (Screening)

There are no true screening tests available related to ICR. In the event of injury or the presence of clinical findings that suggest intracranial dysfunction, specific diagnostic tests are initiated to determine a cause.

Collaborative Interventions

There are many interventions related to caring for patients with ICR issues. A few of the most common examples are discussed. The overarching goal of caring for patients is to prevent secondary injury (damage to the adjacent vulnerable tissues) by improving cerebral perfusion. This is primarily achieved by decreasing cerebral edema and ICP, which will improve oxygenation to prevent cell death.

Pharmacotherapy

Because impairments in ICR represent many conditions, there are many classes of pharmacologic agents associated with this concept. Table 11.3 presents these agents, and they are described further here.

Osmotic diuretics. Osmotic diuretics create an osmolar gradient that draws water across the blood-brain barrier, leading to a decrease in interstitial volume and a subsequent decrease in ICP. Mannitol is the agent used most commonly to achieve ICP control in a variety of conditions, and it has been shown to improve cerebral blood flow. Hypertonic saline is increasingly being used, but research has not clearly determined the volume, tonicity, or most effective method of administration.[16]

Sedatives. Sedatives can decrease ICP by reducing metabolic demand. Propofol (Diprivan) is frequently used in intensive care settings because it has a short half-life and is easily titrated, permitting frequent neurologic assessment. Barbiturate coma is sometimes used as a final effort to control increased ICP, but there is little clinical evidence to support its use.[16] Benzodiazepines, such as lorazepam (Ativan), are another sedative option. Sedatives should be used with caution during the acute period of a traumatic brain injury as they can alter the individual's level of consciousness, thus complicating assessment of neurologic function.

Analgesics. Pain increases oxygen demand; therefore, in addition to controlling pain for patient comfort, it is controlled

TABLE 11.3 Pharmacologic Agents Commonly Used to Treat Problems With Intracranial Regulation

Classification	Indications specific for intracranial regulation	Most common agents used
Osmotic diuretics	Reduction of ICP by reducing fluid	Mannitol
Sedatives	Reduction of metabolic demand to reduce ICP	Propofol, lorazepam
Analgesics	Pain control to reduce oxygen demand	Fentanyl, morphine
Antiepileptics	Seizure control	Phenytoin, valproic acid
Glucocorticoids	Cerebral edema associated with pathologies	Dexamethasone
Antipyretics	Fever control to reduce metabolic demand	Acetaminophen
Antihypertensives	Reduce blood pressure in hemorrhagic stroke	Labetalol, transdermal nitroglycerin paste, nicardipine
Antiparkinsonian agents	Restore balance of dopamine in brain	Levodopa, pramipexole, ropinirole, bromocriptine, selegiline
Cholinesterase inhibitors	Mild to moderate dementia	Donepezil, rivastigmine, galantamine
	Moderate to severe dementia	Memantine

ICP, intracranial pressure.

to avoid compromising sufficient oxygen delivery to ischemic neuronal cells. The use and choice of sedative agents should be individualized according to specific clinical circumstances and provider expertise. Short-acting narcotics, such as fentanyl or morphine, are generally preferable to allow for periodic neurologic assessments. As with sedatives, analgesics should be used with caution as they can alter an individual's level of consciousness.

Antiepileptics. Antiepileptics may be used as continuous therapy for those who are diagnosed with a seizure disorder, or they may be used as a prophylactic or treatment measure for those with increased ICP. These medications act by stabilizing nerve cell membranes and preventing the distribution of the epileptic discharge. Initial seizure management of traumatic brain injury patients includes phenytoin (Dilantin) or valproic acid (Depakote). Patient education is important because there are many serious side effects associated with antiepileptic medications.

Glucocorticoids. Glucocorticoids may be indicated for use in some ICR problems and are contraindicated in others. Dexamethasone (Decadron) may be effective in reducing cerebral edema related to tumors, abscesses, and central nervous system infections. Steroids are not recommended for improving outcome or reducing ICP. In patients with severe traumatic brain injury, high-dose methylprednisolone is associated with increased mortality.[11]

Antipyretics. Fever may worsen the outcome after stroke and severe head injury by aggravating secondary brain injury caused by increased metabolic demand, which reduces oxygen available to brain tissue and causes ischemia. Normothermia should be maintained through the use of antipyretic medications, such as acetaminophen, or other treatments ,such as mechanical cooling.

Antihypertensive medications. Depending on the ICR condition, antihypertensive medications may be detrimental or beneficial. The mean arterial pressure must be adequate to maintain sufficient cerebral perfusion pressure to limit secondary injury. Because of this, higher systemic blood pressures are tolerated in patients with ICR conditions that impair cerebral perfusion pressure. In these patients, antihypertensive medications are not recommended, and medications may be initiated in order to sufficiently raise the systemic pressure, particularly if the ICP is elevated. Several studies have shown that lowering the systemic blood pressure in patients with acute ischemic stroke has been associated with clinical deterioration. Conversely, reducing blood pressure in patients with a hemorrhagic stroke may be beneficial by minimizing bleeding and vascular damage.[7]

Antiparkinsonian medications. Antiparkinsonian medications attempt to restore the balance of dopamine through one of several mechanisms, depending on drug type. The most effective drugs are dopaminergic drugs, which replace dopamine or mimic its action in the brain. Another group of drugs delays the breakdown of dopamine, thus increasing the level in the brain. Levodopa (Sinemet) is the most commonly used antiparkinsonian medication; it is converted to dopamine in the central nervous system, where it serves as a neurotransmitter. To minimize the side effects of dopamine in the periphery, another medication is administered with levodopa. In the United States this drug is carbidopa, which prevents the conversion of levodopa to dopamine until it reaches the brain. Dopamine agonists mimic the effect of dopamine by stimulating the same cells as dopamine. Monoamine oxidase B is an enzyme that breaks down levodopa in the brain. Monoamine oxidase B inhibitors prolong the effectiveness of dopamine and levodopa.

Cholinesterase inhibitors. Cholinesterase inhibitors are prescribed to patients with mild to moderate dementia to make acetylcholine more available, improving cortical function. In moderate to severe dementia, an NMDA (*N*-methyl-D-aspartate) receptor antagonist may have a neuroprotective function and may also decrease dementia symptoms. However, it does not slow progression of the disease.[17]

Thrombolytics. Thrombolytics can be used to restore perfusion in individuals who have been diagnosed with an ischemic stroke. Plasminogen activators, such as tissue plasminogen activator can be administered intravenously to help dissolve clots and, thus, reperfuse the portion of the brain that is suffering from ischemia. This treatment does come with a risk of potential hemorrhage, and evidence demonstrates that the best outcomes occur if tissue plasminogen activator is given within 4.5 hours of the onset of stroke symptoms.[18]

Anticoagulants. Anticoagulants are often used as a preventive measure in individuals with increased risk factors

for an ischemic stroke, though they can result in an increased risk for hemorrhagic stroke. Individuals who suffer from atrial fibrillation, for example, are at risk for the formation of thrombi in the atria of the heart which can then send emboli to the brain causing an ischemic stroke. Anticoagulants such as warfarin can be used prevent thrombi from forming. However, individuals taking anticoagulants are at a higher risk for developing bleeding, especially in the case of mild head trauma that would not otherwise result in a bleed. Because there is such risk, the risks and benefits must be weighed for each individual.

Surgical Interventions

Many types of cranial surgery are available to address ICR problems. The most common include decompressive craniectomy, craniotomy, shunt, stereotactic, and endovascular procedures.

Decompressive craniectomy. A decompressive craniectomy removes the rigid confines of the skull, allowing for expansion of the cranial contents and lowering the ICP. This particular surgery is often indicated with a traumatic brain injury. Potential complications of this surgery include herniation through the skull defect, spinal fluid leakage, wound infection, and epidural and subdural hematoma.

Craniotomy. A *craniotomy* may be performed to remove a lesion or tumor; repair a damaged area; or relieve pressure and/or drain blood secondary to epidural, subdural, or intracerebral hematomas.

A temporal lobectomy may be performed to help control seizures. Frequently, the origin of seizures is either the hippocampus or the amygdala, which is located in the temporal lobe of the brain (see Diagnostic Tests, Electroencephalogram). If seizures are found to arise from these areas, a temporal lobectomy surgery is performed to resect the identified area.

Stereotactic procedure. Stereotactic procedures allow precise localization of a specific area of the brain and may be used for dissection or to obtain a biopsy.

Shunt procedure. A shunt is an artificial pathway for excessive cerebrospinal fluid to be drained from an area of the brain to an extracranial location using a tube or implanted device. Accumulation of cerebrospinal fluid may be the result of overproduction, obstruction, or problems with normal reabsorption. Placement of a ventriculoperitoneal shunt is a common example of this type of procedure.

Endovascular procedure. An endovascular procedure represents a minimally invasive approach to treating vascular problems by inserting microcatheters into the vessel. In the context of intercranial regulation, endovascular procedure may be indicated with ischemic stroke or cerebral aneurysm. One such intervention is a mechanical thrombectomy, during which the occlusion causing an ischemic stroke is removed. The endovascular repair of aneurysms is accomplished through a technique called coiling.[18] These procedures have the benefit of being minimally invasive and having good outcomes.

Ongoing Assessment

With prevention of secondary injury being the goal of patient care, it is of upmost importance to recognize changes in a patient's condition early. For this reason, thorough and frequent neurologic assessment is critical when caring for a patient with ICR problems. A complete neurologic assessment includes determining level of consciousness, assessing GCS score, and performing cognitive, motor, sensory, and reflex tests.

Vital signs should be monitored at regular intervals on all patients with an ICR problem. The frequency will be dictated by the condition and acuity of the patient. Assessment should be frequent enough to detect significant changes early so that the appropriate interventions can be implemented to prevent patient deterioration.

Intracranial Pressure and Cerebral Perfusion Pressure Monitoring

It is imperative that the brain receive a constant, adequate blood supply to function. Patients with severe head injuries should have continuous ICP and cerebral perfusion pressure monitoring. If these values are not optimal, several possible collaborative and nursing interventions are possible. Most guidelines recommend that treatment for elevated ICP should be initiated when ICP is greater than 22 mm Hg.

Interventions to Lower Intracranial Pressure

Positioning. The intracranial venous system consists of canals and sinuses, and unlike the peripheral venous system, it lacks valves. Interventions promoting venous outflow from the head decrease cerebral volume and help lower ICP. Such interventions include head-of-bed elevation and proper alignment of the head and neck with the body. Head-of-bed elevation of 30 degrees is usually recommended to decrease ICP. It is also important to keep the head and neck midline (to prevent compression of jugular veins) and to limit hip flexion. Head-of-bed elevation potentially could decrease cerebral perfusion by increasing venous return. Therefore, head-of-bed elevation is recommended as long as the cerebral perfusion pressure remains at an appropriate level.

Activity management. Balance between being efficient and not increasing oxygen demand when providing nursing care is crucial. Clustering of many nursing tasks at once will increase oxygen demand and may compromise cerebral perfusion. Distribution of care procedures over a longer period is preferable.

Airway management. Endotracheal suctioning stimulates coughing, which increases ICP. Patients with increased ICP should undergo endotracheal suctioning only when suctioning is indicated. In addition, these patients may need to be sedated before the procedure. Careful assessment is necessary to maintain an adequate airway and minimize complications from increased ICP.

Hyperventilation. Prophylactic hyperventilation ($PaCO_2$] to ≤25 mm Hg) in traumatic brain injury is not recommended because it decreases perfusion, which will negatively affect oxygen delivery. Hyperventilation is recommended only as a temporary measure to reduce elevated ICP.[11] A 1-mm Hg change in $PaCO_2$ is associated with a 3% change in cerebral blood flow.[2] Hyperventilation can also increase extracellular lactate and glutamate levels, which may contribute to secondary brain injury.[16]

Bowel management. Constipation increases intraabdominal pressure and causes straining when defecating, thereby raising

ICP. Stool softeners or laxatives may be necessary to minimize these untoward effects on ICP.

Drainage of cerebrospinal fluid. Catheters that monitor ICP can also be used for therapeutic drainage of cerebrospinal fluid in order to reduce ICP. If hydrocephalus is present, a ventriculostomy may be used to remove cerebrospinal fluid. In some instances, a permanent catheter is placed to drain cerebrospinal fluid, which is known as a ventriculoperitoneal shunt.

Nutrition Management

Nutrition management is a high priority when caring for patients with ICR conditions. The nurse should advocate for an early dietary consultation in order to ensure prompt and adequate nutrition to facilitate healing. Depending on the ICR impairment and patient condition, enteral or parenteral feeding may be appropriate. Swallowing function should be assessed before initiating enteral feeding for certain patients, particularly patients who have experienced a stroke.

Patient Education

Patient education is always a primary nursing function, which is no exception when caring for patients with ICR conditions. Education should be focused on all levels of health promotion. Problems involving the brain can have devastating and long-lasting effects. Nurses are uniquely qualified and available to assist patients and their families throughout the course of their care.

Rehabilitation

Particularly after a stroke or head injury, rehabilitation is an important part of patient care. The focus is on returning the patient to optimal functioning. The composition of the rehabilitation team will depend on the patient's needs and may include speech therapy, physical therapy, and occupational therapy, with medical and nursing care as needed. As soon as the patient is stabilized in the acute care setting, rehabilitation should begin. Because recovery is dependent on the formation of new neural networks, it may take months to years to determine how much function will be regained.

INTERRELATED CONCEPTS

Many concepts are closely related to ICR. Those considered most important are shown in Fig. 11.6.

Cognition is dependent on an optimally functioning brain. If ICR is disrupted, depending on the area of the brain affected, cognitive function may be impaired either temporarily or permanently. The degree of cognitive function impairment is dependent on the number of neuronal cells affected.

The brain controls movement, coordination, and balance. Thus, optimal **Mobility** is dependent on an intact neurologic system and effective ICR. Individuals who have ICR problems may become immobile because of unsteadiness, imbalance, or the inability to initiate or execute purposeful movements of the arms, legs, or trunk.

Perfusion and **Gas Exchange** are intimately involved with ICR and have been discussed thoroughly in the Normal Physiological Process and Physiological Consequences sections. Without adequate perfusion of oxygen- and nutrient-rich blood, the neurons are unable to function. **Hormonal Regulation** is dependent on normal ICR because of the location of the hypothalamus and pituitary glands within the brain. Damage to these structures or surrounding brain tissue (from trauma or disease) can have disastrous effects on hormonal regulation. **Clotting** is another concept that influences ICR. Irregularities in clotting can cause the formation of clots or result in a hemorrhage, both of which can affect blood supply to and functioning of the brain.

CLINICAL EXEMPLARS

There are many clinical exemplars of ICR. Common exemplars are presented in Box 11.2. Although exemplars are listed under a specific category, there are instances in which an exemplar could fit under more than one category. For example, brain tumors can be considered *pathology* and can also cause problems with *neurotransmission*. Similarly, if a brain tumor is large enough and exerts enough pressure, it can also disrupt *perfusion*. The categories are not meant to be all-inclusive or exclusive but, rather, a suggested organization framework for ICR conditions. A brief discussion of common clinical exemplars follows. For detailed explanations and the nursing care for all the exemplars, see medical–surgical, pediatric, and gerontology textbooks.

Featured Exemplars

Stroke

A stroke occurs when there is a loss of blood flow to an area of the brain, causing the neurons to die. Two major classifications of stroke

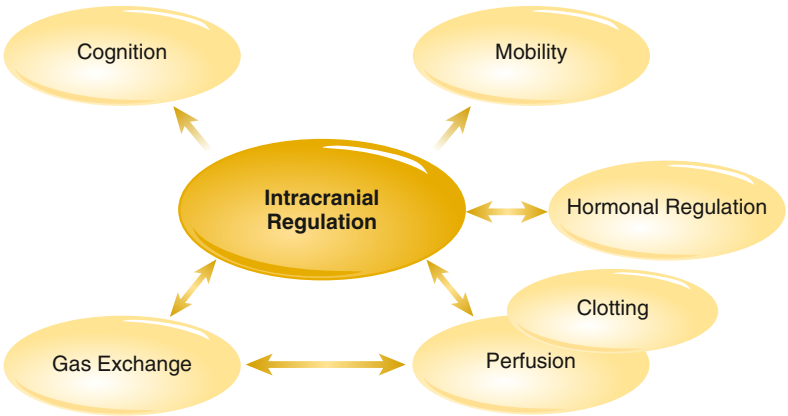

Fig. 11.6 Intracranial Regulation and Interrelated Concepts.

BOX 11.2 EXEMPLARS OF INTRACRANIAL REGULATION

Perfusion

Ischemic Stroke
- Embolic stroke
- Thrombotic stroke

Hemorrhagic Stroke
- Intracerebral hemorrhage
- Intraventricular hemorrhage
- Ruptured aneurysm
- Subarachnoid hemorrhage

Head Injury
- Epidural hematoma
- Skull fractures
- Subdural hematoma
- Traumatic brain injury

Neurologic Transmission
- Epilepsy
- Seizure

Pathology

Brain Neoplasm
- Benign brain tumor
- Malignant brain tumor

Degenerative Conditions
- Alzheimer disease
- Dementia
- Huntington disease
- Multiple sclerosis
- Parkinson disease

Inflammatory Conditions
- Bacterial meningitis
- Brain abscess
- Encephalitis
- Viral meningitis

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are ischemic stroke and hemorrhagic stroke. Ischemic strokes often occur in the presence of dysrhythmias or arteriosclerosis, whereas hemorrhagic strokes often occur as the result of prolonged hypertension or a hypertensive crisis. Stroke is the third leading cause of death and serious long-term disability. Nearly three-quarters of all strokes occur in people older than age 65 years. The risk of having a stroke more than doubles each decade after age 55 years. In the United States, stroke death rates are higher for Black individuals than they are for White individuals, even at younger ages.[19]

Traumatic Brain Injury

Traumatic brain injury occurs when a blow to the head causes injury to the brain. Some common causes are motor vehicle accidents, falls, and violence. Brain injury can range from mild to severe. With significant injury, the brain tissue swells, leading to cerebral edema and increased ICP; intracranial bleeding may also occur, further contributing to increased ICP and ischemia of brain tissue. Traumatic brain injury is a major cause of death and disability in the United States.[11]

Epilepsy

Epilepsy, a type of seizure disorder, is characterized by recurrent unprovoked seizures. A seizure happens when abnormal electrical activity in the brain causes an involuntary change in body movement, sensation, awareness, or behavior. Risk factors are more common in children younger than age 2 years and adults older than age 65 years.[20]

Alzheimer Disease

Alzheimer disease is one of many degenerative conditions that affect ICR. It is the most common form of dementia, affects more than 5 million Americans, and is the sixth leading cause of death in the United States. Almost two-thirds of those with Alzheimer disease are women. The most common form occurs in individuals older than age 65 years.[21] The exact cause of Alzheimer disease is unknown, but it is thought to be associated with abnormal plaque formation in the brain tissue and neuron tangles. This progressive disease results in memory loss, loss of physical function, and brain death over its course.

Meningitis

Meningitis is a pathologic condition affecting ICR that is caused by inflammation of the protective membranes covering the brain and spinal cord. Meningitis can be viral, bacterial, fungal, parasitic, amebic, and noninfectious.[22] Viral meningitis is the most common type and less severe; bacterial meningitis is less common but is usually severe and associated with higher mortality. The populations at risk, transmission, and treatment vary widely, depending on the cause.

CASE STUDY

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Case Presentation

Mr. James Hobson is a 69-year-old male with a history of hypertension that is fairly well controlled on medication. He has been a smoker for 52 years and has a body mass index of 37.3. He awoke yesterday morning complaining of blurry vision and some weakness on the left side of his body. He thought he had just slept wrong, so he was not concerned. Later in the morning, he was having trouble walking and his wife convinced him to call his physician. The physician's office called 9-1-1, and Mr. Hobson was transported to the nearest hospital.

Upon arrival to the emergency department, the physical exam findings were as follows: heart rate, 112 beats/min; blood pressure, 172/90 mm Hg; respiratory rate, 24 breaths/min; O_2 saturation, 90%; arm and leg weakness (3/5); and decreased sensation. He was awake and responding to questions appropriately, although slowly. The following diagnostics tests were ordered: noncontrast CT of the head; electrocardiogram; complete blood count with platelets, cardiac enzymes, and troponin; electrolytes; blood urea nitrogen; creatinine; glucose; prothrombin time/international normalized ratio; and partial thromboplastin time. A noncontrast CT can exclude or confirm the presence of hemorrhage. The sensitivity of a noncontrast CT to show ischemia increases after 24 hours. His patient's CT scan did not show any signs of hemorrhage. Because it was unclear exactly when the symptoms began, the decision was made not to administer a thrombolytic.

Case Analysis Questions

1. What is the core feature of the onset of hemorrhagic and ischemic strokes?
2. What are other conditions that mimic a stroke presentation?
3. Which diagnostic test is performed to determine whether a suspected stroke is hemorrhagic or ischemic?

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CONCEPT 12

Hormonal Regulation

Jean Foret Giddens

Hormonal regulation is a complex physiological process with integrated responses involving various glands, hormones (produced and secreted by the glands), and the action of hormones on the target tissues. Although each gland and hormone has a specific function, collectively hormonal regulation has five overarching functions: fetal differentiation of the reproductive and central nervous system, sequential growth and development during childhood and adolescence, reproduction, metabolic activity, and adaptive responses.[1] Imbalances of hormonal regulation can lead to significant health and social consequences. This concept presentation focuses on the normal process of hormonal regulation, hormonal imbalance, assessment, and interventions to optimize hormone balance.

DEFINITION

The term *hormonal regulation* is often used in the context of describing a specific group of hormones or metabolism. The focus of this concept presentation is broad, encompassing the general regulatory process including hormone production, secretion, and action. Clearly, the function and physiological action of each hormone are unique, and a presentation of details for each gland, each hormone, and conditions associated with imbalances is not intended; rather, a global perspective is proposed. Given this perspective, what is meant by hormonal regulation? For the purposes of this concept presentation, hormonal regulation is defined as *physiological mechanisms that regulate the secretion and action of hormones associated with the endocrine system.*

Several additional terms are important to fully understand this concept. An *endocrine gland* refers to a specialized cluster of cells, tissue, or an organ that produces and secretes hormones directly into the bloodstream. This distinction is important because there are also other types of glands (known as exocrine glands) that excrete other nonhormonal substances or fluids through ducts to body organs, cavities, or the skin. Examples include sweat glands, salivary glands, mammary glands, and Bartholin glands. Exocrine glands are excluded from this concept presentation because they do not secrete hormones. A *hormone* is a chemical substance that stimulates cellular action in target tissues. *Target tissue* refers to the specific tissue that hormones can influence. A final term worth mentioning is *receptor site,* which refers to a location on the surface of a cell where hormones attach and gain access to the cell, allowing for physiological influence.

SCOPE AND CATEGORIES

The scope of hormonal regulation ranges from the normal range of circulating hormone (based on physiological need) to abnormal secretion, in either excess or deficient amounts. This range, shown in Fig. 12.1, is presented as a continuum because the secretion of hormones is variable, and it changes in response to physiological feedback. Typically the prefix *hypo,* in reference to the gland or hormone involved, is used to describe deficient states, and the prefix *hyper* is used to describe states of excess. The scope of hormonal regulation can also be thought about from the perspective of the hormones and glands represented. From this perspective the scope of hormonal regulation represents hormones produced and secreted from the hypothalamus, anterior pituitary, posterior pituitary, thyroid, parathyroid, adrenal cortex, ovary, testes, and pancreas. Hormones fall into one of three chemical classifications:

- peptide hormones (consist amino acid chains);
- amine hormones (derived from amino acid tyrosine);
- steroid hormones (derived from carbohydrates).

Hormones are also classified by three functional groups. *Homeostatic hormones* maintain metabolic balance and regulate physiologic systems. *Glucocorticoids* help the body adapt to stressful or emergent situations, regulate the metabolism of proteins and carbohydrates, and regulate glucose levels. *Gonadal hormones* control reproductive development and function.

NORMAL PHYSIOLOGICAL PROCESS

Hormones are produced and secreted by glands within the brain and other parts of the body. Brain hormones from the hypothalamus and pituitary have a significant influence through an interaction between brain and body interactions. These interactions

Fig. 12.1 Scope of Concept: Hormonal Regulation.

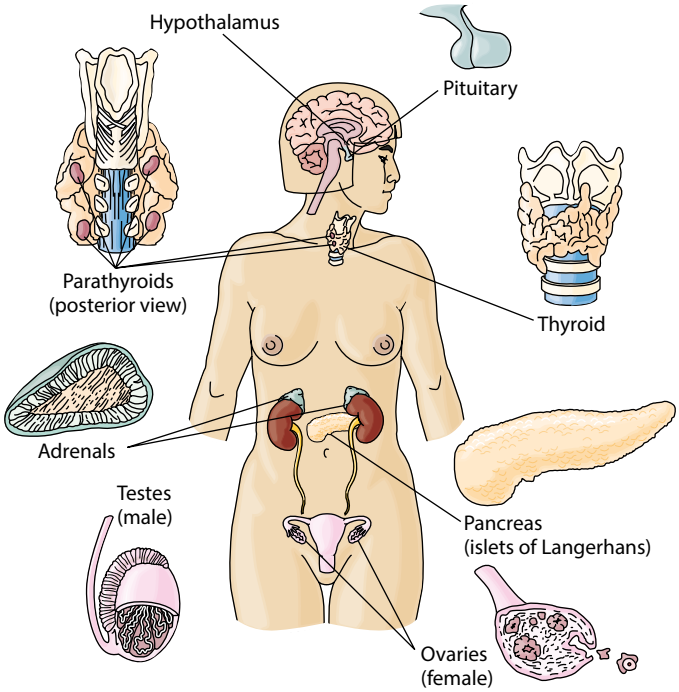

Fig. 12.2 Location of Various Endocrine Glands. (From Ignatavicius D.D. & Workman M.L. (2013). Medical–surgical nursing: *Patient-centered collaborative care* (7th ed.). St Louis: Elsevier.)

form feedback loops that are at the heart of regulatory activity. Fig. 12.2 presents the locations of various adrenal glands, and Box 12.1 summarizes these glands, the hormones they produce, the target tissue, and the physiological effect.

Hormone Production, Secretion, and Transport

Many physiological functions are directed by hormones, which serve as chemical messengers that influence or control functions of other organs or body tissues. The large majority of hormones are produced and secreted by endocrine glands (see Fig. 12.2). However, some hormones are produced by specialized tissues such as the gastrointestinal mucosa and kidney. The secretion of a hormone by the gland is in response to a certain level of a substance (e.g., sodium or glucose level) or in response to an alteration within the cellular environment. The glands are composed of clusters of secretory cells that resemble a multilobed berry (such as a raspberry) and are referred to as *acini*. Once secreted from the gland, hormones are transported to their target tissue. Most hormones are transported to one or more target tissues throughout the body by the circulatory system. Glands have a rich blood supply allowing for hormones to enter the bloodstream quickly. Water-soluble hormones circulate in the blood in free form, whereas most lipid-soluble hormones bind to a carrier (e.g., a protein) for transportation. In some cases, hormones do not enter the circulatory system because the hormone has a localized effect—in other words, the target tissue is adjacent to the endocrine gland that produces the hormone.

Hormone Action on Target Tissue

Hormones have very specific cellular effects but only on designated cells within the target tissue. Hormones depend on receptor sites to gain access and exert their specific physiological action within the cell.[1] Target cells have unique receptor sites for the designated hormone, much like a specific key is needed for a lock. For this reason, hormones are unable to influence cells unless the cell has the appropriate receptor site allowing a hormone to act on the cell. The more receptors on the cell, the higher affinity or sensitivity the cell has for that particular hormone. The cell has the ability to adjust the number of receptors (or sensitivity) based on the concentration of circulating hormone. When the circulating concentration of a hormone increases, fewer receptor sites are needed; when the concentration decreases, more receptor sites become available.

Control of Hormone Secretion

Maintaining hormone levels in normal physiological ranges is accomplished through feedback systems, although the specific mechanism varies depending on the gland or hormone involved. Hormonal regulation occurs through four types of feedback control: negative feedback, positive feedback, biologic rhythms, and central nervous system control.

Negative Feedback

The most common type of feedback system for hormonal regulation is the negative feedback system. Information regarding a hormone level or the effect of a hormone is communicated back to the gland that secrets the hormone which directs the need for hormone secretion or suppression.[1] One of the simplest examples is the secretion of insulin based on serum glucose levels. When serum glucose rises, the pancreas secretes insulin and insulin facilitates the transportation of glucose into the cell. As serum glucose levels drop, the pancreas inhibits insulin secretion. In this example, serum glucose levels trigger or inhibit the release of insulin by the pancreas.

Negative feedback is more complex when multiple glands and hormones are involved, but the same general process applies. For example, the secretion of thyroid hormones involves three glands: the hypothalamus, the anterior pituitary gland, and the thyroid gland. The hypothalamus secretes thyroid-releasing hormone, which triggers the release of thyrotropin, which in

BOX 12.1 Endocrine Glands, Hormones Secreted, and Physiological Effects

Hypothalamus
- Corticotropin-releasing hormone /*anterior pituitary*/release of corticotropin hormone
- Thyrotropin-releasing hormone/*anterior pituitary*/release of thyrotropin
- Gonadotropin-releasing hormone/*anterior pituitary*/release of luteinizing hormone and follicle-stimulating hormone
- Growth hormone-releasing hormone/*anterior pituitary*/release of growth hormone
- Growth hormone-inhibiting hormone/*anterior pituitary*/inhibition of growth hormone
- Prolactin-inhibiting hormone/*anterior pituitary*/inhibition of prolactin
- Melanocyte-inhibiting hormone/*anterior pituitary*/inhibition of melanocyte-stimulating hormone

Anterior Pituitary
- Thyrotropin/*thyroid*/stimulates synthesis and release of thyroid hormone
- Corticotropin/*adrenal cortex*/stimulates synthesis and release of cortisol
- Luteinizing hormone/*ovary and testis*/stimulates ovulation and progesterone secretion in females; testosterone secretion in males
- Follicle-stimulating hormone/*ovary and testis*/stimulates estrogen secretion and follicle maturation in females; spermatogenesis in males
- Prolactin/*mammary glands*/stimulates breast milk projection
- Growth hormone (also known as somatotropin)/*bone, muscle, and soft tissue*/promotion of growth and metabolism
- Melanocyte-stimulating hormone/*skin*/pigmentation

Posterior Pituitary
- Antidiuretic hormone/*kidney and blood vessels*/promotes water reabsorption
- Oxytocin/*uterus and mammary glands*/stimulates uterine contractions

Thyroid
- Triiodothyronine (T_3) and thyroxine (T_4)/*body-wide*/increased metabolism
- Calcitonin/*bones and kidneys*/lowers serum calcium and phosphate

Parathyroid
- Parathyroid hormone/*bone, kidney, and gastrointestinal tract*/increases serum calcium and phosphate

Adrenal Cortex
- Glucocorticoids (cortisol)/*body-wide*/stress response, glucose regulation, immunity
- Mineralocorticoids (aldosterone)/*kidney*/retains water and Na^+, exertion of K^+

Adrenal Medulla
- Catecholamines (epinephrine and norepinephrine)/*heart, blood vessels, lung, kidney, liver, pancreas, and skin*/stress response: fight-or-flight reaction

Gonads
- Estrogen/uterus, ovary, and breast/reproduction
- Progesterone/uterus, ovary, breast, and skin/development of ova, female sex characteristics
- Testosterone/sex organs, muscle, and skin/development of sperm, male sex characteristics

Pancreas
- Insulin/*liver, muscles, and fat tissue*/regulates metabolism, lowers blood glucose
- Glucagon/*liver, muscles, and fat tissue*/elevates blood glucose

K^+, potassium ions; *Na^+*, sodium ions.

turn stimulates the secretion of triiodothyronine (T_3) and thyroxine (T_4) from the thyroid gland. As plasma levels of T_3 and T_4 rise, this information is communicated back to the hypothalamus and anterior pituitary gland to inhibit thyroid-releasing hormone and thyroid-stimulating hormone secretion.

Positive Feedback

Positive feedback occurs when an increasing level of hormone triggers further elevation of hormone stimulation. The classic example of positive feedback is seen with the menstrual cycle, in which luteinizing hormone is secreted by the pituitary gland, which triggers the ovaries to secrete estradiol, which in turn stimulates the pituitary gland to secrete more luteinizing hormone.[1]

Biologic Rhythms

The secretion of some hormones is controlled by biologic rhythms. One example of this is the influence of the circadian rhythm on cortisol secretion. Cortisol secretion is highest in the morning and lowest in the late evening. Disruptions in biologic rhythms and sleep deprivation can affect the normal secretion patterns of some hormones.[2]

Central Nervous System Stimulation

Another type of control mechanism for the secretion of hormones is through central nervous system stimulation.[1] For example, when an individual experiences a stressful situation, the sympathetic division of the autonomic nervous system is activated, triggering the release of epinephrine from the adrenal medulla (the fight-or-flight response). When the perceived stress is resolved, the adrenal medulla reduces the release of epinephrine.

Age-Related Differences and Pregnancy

Glands and the action of hormones are influenced by the aging process (particularly during adolescence and among older adults) and pregnancy.

Childhood and Adolescence

Growth in early childhood is primarily regulated by growth hormone, thyroid hormone, and insulin-like growth factor 1. Reproductive glands and hormones lie mostly dormant during childhood and become active at the onset of adolescence.[3] During puberty, the anterior pituitary increases secretion of gonadotropins (luteinizing hormone and follicle-stimulating hormone). In the male, this stimulates the maturation of the testes, production of testosterone, and development of external genitalia. In the female, this stimulates estrogen production, the maturation of ovaries leading to ovulation, and development of external genitalia.

Older Adults

In response to advancing age, most glands become smaller with reduced hormone production.[1] This does not necessarily lead to

hormonal regulation impairments, but the physiological activity of the hormone is reduced, which is linked to some common physiological changes associated with aging. For example, frailty has been shown to be associated with a pattern of hormonal changes in older adults.[4] Also, menopause in women occurs as a normal response to aging and is associated with a reduction of estrogen produced by the ovaries. Reduced metabolism results in cold intolerance and reduced appetite. A reduction in the production of antidiuretic hormone also occurs, leading to more dilute urine and thus leaving older adults more at risk for dehydration.

Pregnancy

The ability to achieve and maintain a pregnancy requires a precise balance of hormonal regulation. The menstrual cycle and ovulation are regulated by the hypothalamus, anterior pituitary, and ovaries through the secretion and inhibition of estrogen, progesterone, follicle stimulating hormone, and luteinizing hormone. Likewise, fertilization of the ovum and implantation of the blastocyst into the wall of the uterus requires precise levels of progesterone and estrogen. Glucocorticoids also rise during pregnancy, which may impair progesterone secretion, potentially causing a disequilibrium.[5] In addition to estrogen and progesterone, other hormones important to sustaining the pregnancy include human chorionic gonadotropin hormone (which is only produced during pregnancy), human placental lactogen hormone, and relaxin. Oxytocin is a hormone produced by the pituitary gland that stimulates uterine contractions, triggering the onset of labor.

VARIATIONS AND CONTEXT

Many problems can lead to hormone imbalance. Two general categories of hormonal imbalance can occur for each hormone secreted by endocrine glands: deficiency or excess. Problems with hormone deficiency or excess are usually associated with an issue in production/secretion or in the regulatory mechanisms directing the glands. Glands can be affected in a number of ways, including by trauma; congenital, genetic, and inflammatory conditions (including autoimmune conditions); and tumors. Damage to a gland can result in a reduction or loss of the ability of that gland to produce and secrete a hormone.

For example, damage to the thyroid gland can result in the inability to produce thyroid hormones. Several other conditions can result in excessive production and secretion of a hormone. Signaling errors, caused by improper levels of other hormones or ineffective negative feedback mechanisms, can lead to excessive production or inhibition of hormone secretion. Other physiological triggers can result in undesired elevations or deficiencies in hormones. For example, excessive and sustained stress can result in chronic elevated circulating cortisol; interruption of the circadian cycle (e.g., from sleep deprivation) can result in reduced secretion of melanin.

Although hormonal deficiency or excess is often caused by a production/secretion problem, other variations can occur if the hormone loses its effect on the tissue or is unable to gain access to the cells as a result of problems with receptor sites, often referred to as *insensitivity*. A classic example of this is seen in type 2 diabetes, in which insulin insensitivity develops at the receptor sites.

CONSEQUENCES

Understanding the physiological consequences of hormone imbalance requires an understanding of the physiological effects of the hormones, presented in Box 12.1. Thus, an excess or deficiency of any hormone can create significant physiological challenges. The severity of such effects can vary widely—from the devastation a partnered couple experiences with infertility to life-threating states such as those seen in thyroid storm, diabetes insipidus, or diabetic ketoacidosis. Common consequences of impaired hormonal regulation can include altered growth and development, altered cognition, altered metabolism, altered reproduction, and altered adaptive responses. The disruption of any hormone production may result in potential complications associated with the underlying condition and the potential need for lifetime hormonal replacement therapy.

RISK FACTORS

All individuals of all population groups have the potential for problems with hormonal regulation. Risk factors for hormonal imbalance are usually considered in the context of the specific gland and hormone involved. For example, risk factors involving the anterior pituitary gland and the secretion of growth hormone differ significantly from risk factors associated with the hormonal imbalance involving the pancreas and secretion of insulin. Although risk factors are typically described at the level of each gland and hormone dysfunction, there are several risk factors that are shared by many hormonal imbalances (Box 12.2). Exogenous supplementation of any hormone places an individual at risk for excess or deficient hormone levels because dosing needs and medication adherence vary. In response to advanced age, most glands become smaller with reduced hormone production, which increases the risk for certain hormonal deficiencies and reduced metabolism. The state of pregnancy can trigger hormonal imbalances such as gestational diabetes and thyroid imbalances.[6,7] Undetected or unmanaged thyroid

BOX 12.2 Common Risk Factors for Hormonal Imbalance

- Age
- Autoimmune conditions
- Cancer treatment
- Chromosomal deficiencies
- Chronic medical conditions
- Family history
- Genetics
- Hormonal supplement therapy
- Obesity
- Pregnancy
- Sedentary lifestyle
- Stress
- Trauma

imbalances during pregnancy can lead to congenital hypothyroidism in the infant.[8] Obesity and sedentary lifestyle are associated with many hormonal imbalances, such as diabetes and polycystic ovarian syndrome.[9] Genetics, chromosomal abnormalities, and family history, particularly a history of autoimmune responses, increase risk for several hormone deficiencies.

ASSESSMENT

Because hormonal regulation affects all body systems, and because each hormone has a specific role, there are no standard questions or examination procedures for all glands and hormones. Instead, hormonal function is considered adequate unless the patient, a parent, or other family member reports a symptom; a clinical finding presents itself that suggests an abnormality; or if known risk factors exist, warranting special screening. These situations trigger an in-depth history, examination, and diagnostic testing based on the presenting sign and/or symptom. For this reason, this section provides a very broad discussion regarding endocrine assessment.

History

The patient's history provides the foundation for assessment. Baseline history always includes gender, age, marital status, past medical history (including age at menarche, last menstrual period, and reproductive history for females), current conditions, current medications, psychosocial history, and family history.[10] Often, these baseline data provide important clues if a hormonal imbalance is suspected. For example, some hormonal imbalances are more common in men than in women, and some are more common in older adults than they are in children.

From a functional perspective, the symptoms or problems most likely reported by a parent of a child, an adolescent, or an adult patient are often associated with basic physiological functions. Symptoms that are often linked to hormonal imbalances include (but are not limited to) abnormal growth patterns or physical development; changes in activity, energy level; heat and/or cold intolerance; changes in sleep; change in eating patterns, unexplained changes in weight, and thirst; changes in elimination (frequency of urination and bowel function); changes in sexual response, menstrual cycle, reproductive problems, secondary sexual characteristics; and changes in mood, memory, and concentration. Any of these symptoms warrant a symptom analysis of the presenting problem.[10]

Examination Findings

Because of the anatomic location of the glands, most glands, with the exception of the thyroid gland and testes, are inaccessible for direct examination. Thus, most of the examination focuses on evidence of physiological or clinical effects of hormonal function.

Vital Signs, Height, and Weight

Physical examination begins with an assessment of vital signs, height, and weight. For children, the height and weight should be analyzed based on standardized growth charts. Many hormones can affect changes in weight and vital signs, especially those secreted by the thyroid, pancreatic, and adrenal glands. Abnormal growth patterns may be associated with growth hormone (or growth hormone-inhibiting or -releasing hormone).

Inspection

Many clues about hormonal balance or imbalance may be noted during a general inspection, particularly by a healthcare professional with a critical eye.[10] Note the overall skin color and texture, hair texture, body posture, facial characteristics, and affect. Findings associated with one or more hormonal imbalances include unusual dryness, pigmentation, wounds, or other lesions; malformation of the fingernails; unusual hair texture; and excessive hair growth in unexpected areas (e.g., on the face of women) or excessive hair loss. Note anxious or fidgety behavior, a flat affect or an overly animated affect, puffiness around the face (moon face), enlarged facial features and protrusion of the eyes (exophthalmos). Notice the neck and determine whether there is thickening or enlargement that might be caused by an enlarged thyroid gland. Observe for truncal obesity, thinness of the extremities, or enlarged hands and feet. Abnormal findings of the external genitalia (e.g., size, shape, color, and pubic hair distribution) for the patient's age or developmental level may also reveal important clues associated with hormonal imbalance.

Palpation and Auscultation

The thyroid gland and testes are anatomically positioned to allow for direct palpation; ovaries can be palpated through bimanual palpation. The thyroid gland, located on the anterior neck just below the cricoid cartilage, is not particularly easy to palpate unless it is abnormally large or has nodules. An enlargement of the thyroid (goiter) or the presence of nodules are abnormal findings. If the thyroid is enlarged, the area should be auscultated for bruits, which would indicate increased vascular flow. The testes are palpated through the scrotal sac. They should be firm, small, and smooth.[10] An irregular shape or texture are abnormal findings. Ovaries can be indirectly palpated through a bimanual examination as part of a pelvic examination. This examination is usually done by an advanced practice nurse (e.g., a nurse practitioner) or a physician.

Diagnostic Studies

Laboratory Tests

A number of laboratory tests are used to determine hormonal function.

Hormone level. One of the most common ways to assess hormonal function is by a direct measurement of the hormone level in the blood (or other body fluids such as urine). If a hormone is secreted at a consistent rate (e.g., thyroid hormone), then a single sample can be drawn at any time. However, some glands secrete hormones on a cyclic pattern; thus, the specific time the sample is drawn is critical for test analysis. For example, a cortisol level tests adrenal function. Because secretion of cortisol is highest in the morning and lowest in the evening, blood samples should be drawn at 8 a.m. and 4 p.m.[11] When the laboratory test involves the collection of urine, this is often done as a 24-hour urine sample and usually requires specific handling of the sample during the collection period.

An indirect assessment of the hormone function involves evaluating the blood or urine for components affected by the hormone function. For example, blood glucose provides an indirect measure of the pancreatic cells that produce insulin or insulin usage.

Stimulation and suppression testing. These tests are done to evaluate the process for hormone secretion and inhibition. Stimulation testing involves giving the patient a stimulus substance or hormone to stimulate the targeted gland to trigger hormone release. A measure of the hormone level follows, with an elevation in hormone level as the normal (expected) finding. A suppression test involves giving the patient a substance or hormone that suppresses the targeted gland from producing hormone. Subsequent measurement of the hormone level should, in normal circumstances, show a decrease in hormone level.[11]

Imaging

In some cases, imaging of the gland is necessary for diagnostic purposes. Ultrasound can be used for imaging the thyroid, parathyroid, ovaries, and testes. Magnetic resonance imaging or computed tomography scans are very effective for evaluating the pituitary, adrenal glands, pancreas, and ovaries. These scans may involve the injection of a radioactive isotope that allows imaging of a substance in the target tissue.[12]

Biopsy

In some cases, pathology analysis of the gland tissue is needed. A biopsy may be performed to collect tissue sample of the gland involved. Because of the relative ease of accessibility, the thyroid gland is the most common gland for this analysis.

Genetic Testing

An increasingly common approach in the assessment of endocrine-related conditions is genetic testing.[13] Genetic screening involves a family history assessment, patient assessment, and DNA testing. DNA testing is used to identify specific genes associated with an endocrine disorder and identifies genetic mutations that predispose a person to an endocrine condition.

CORE COMPETENCIES

Hormonal Regulation

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to hormonal regulation.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to hormonal regulation.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to hormonal regulation for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to hormonal regulation.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to hormonal regulation.
- Demonstrate clinical judgment founded on broad knowledge of hormonal regulation.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention refers to strategies aimed to optimize health and prevent disease. Primary prevention strategies typically include education, diet, exercise, weight control, injury avoidance, and avoidance of environmental hazards.[14] These basic primary prevention strategies affect hormonal regulation as well. Maintaining a healthy lifestyle optimizes overall health and, thus, provides an optimal physiological environment for hormonal regulation to occur. For example, diet, exercise, and weight control affect the production and function of some hormones, such as insulin, glucagon, and thyroid hormones. Measures to manage stress can prevent excess secretion of cortisol.[15] Maintaining routine sleep–wake patterns optimize the secretion of hormones dependent on a circadian cycle. Preventing head injury through the use of helmets reduces risk of injury to the hypothalamus and pituitary glands.

Secondary Prevention (Screening)

Secondary prevention refers to the early identification of a disease so that prompt treatment can be initiated. The two primary endocrine-related screening recommendations are for thyroid and diabetic conditions and include recommendations for infants and adults.

Infants

A routine congenital thyroid screening in infants is recommended as part of the uniform screening panel. This recommendation includes the screening of every newborn for 31 core conditions, including two endocrine disorders—congenital adrenal hyperplasia and congenital hypothyroidism.[16]

Adults

The two pertinent areas for screening include thyroid and diabetes. According to the US Preventive Services Task Force (USPSTF), there is insufficient evidence to recommend routine screening for thyroid problems among nonpregnant, asymptomatic adults.[17] This is similar to the recommendation from the Canadian Task Force on Preventive Health Care.[18] Because significant adverse effects occur when thyroid disease is undetected during pregnancy, many advocate for thyroid screening early during pregnancy.[19] Regarding gestational diabetes screening, the USPSTF recommends routine screening for all asymptomatic women at 24 weeks of gestation or after.[20] Furthermore, there is insufficient evidence to recommend routine screening in asymptomatic pregnant women before 24 weeks gestation. The USPSTF also recommends prediabetes and type 2 diabetes screening among adults aged 35 to 70 who are overweight or obese (grade B recommendation).[21]

Collaborative Interventions

The management of individuals with endocrine disturbances is complex; for this reason, a detailed discussion for each is beyond the scope of this concept presentation. However, common underlying care principles include a combination of diet, fluid management, pharmacotherapy, surgical options,

radiation, and psychosocial support. This section presents common interventions that are associated with hormonal disturbances and is not intended to be comprehensive for any specific endocrine disorder.

Pharmacotherapy

Pharmacologic treatment for individuals with hormone imbalance typically involves hormone replacement (for deficiencies) or drugs that block production or use of hormones in states of excess hormone production. For this reason, the pharmacologic agents are presented with the underlying problem.

Hypopituitarism. Hypopituitarism results in absent or insufficient production of one or more hormones associated with the pituitary gland. Synthetic human growth hormone is used for growth hormone deficiencies caused by pituitary insufficiency or other conditions, such as Turner syndrome, chronic kidney disease, and small size for gestational age. Testosterone is used as supplement for men with gonadotropin deficiency. Estrogen and progesterone supplementation, also referred to as *hormone replacement therapy,* is indicated for women with gonadotropin deficiency and for the relief of postmenopausal symptoms.[22]

Hyperpituitarism. Three groups of drugs are used to treat conditions associated with hyperpituitarism. Dopamine agonists (bromocriptine and cabergoline) inhibit release of growth hormone; somatostatin analogs (octreotide, lanreotide) inhibit growth hormone secretion; and growth hormone receptor antagonists such as pegvisomant block growth hormone receptors.

Posterior pituitary antidiuretic hormone deficiency. Desmopressin and vasopressin are used as a hormone replacement therapy for antidiuretic hormone deficiency.

Posterior pituitary antidiuretic hormone excess. Tolvaptan and conivaptan are vasopressin antagonists that promote water excretion without loss of sodium.

Adrenal insufficiency (Addison disease). Cortisone, hydrocortisone, prednisone, and fludrocortisone are used for the treatment of conditions associated with adrenocorticoid deficiency.

Hypercortisolism (Cushing disease). Aminoglutethimide (Cytadren), metyrapone (Metopirone), and cyproheptadine (Periactin) interfere with adrenocorticotropic hormone production.

Hypothyroidism. Levothyroxine sodium (Synthroid) is a synthetic hormone preparation that represents the most common form of thyroid replacement therapy.

Hyperthyroidism. Propylthiouracil (Propyl-Thyracil, PTU) and methimazole (Tapazole) block thyroid hormone production.

Hypoparathyroidism. Because the parathyroid regulates calcium, treatment of conditions leading to hypoparathyroidism include calcium supplement, vitamin D, and magnesium sulfate supplements.

Diabetes. A variety of insulin preparations are used for individuals with type 1 diabetes and represent hormone replacement. Categories of insulin are based on the time course of action (onset, peak, and duration of action) and include rapid acting, short acting, intermediate acting, and long acting. Oftentimes insulin is given in combination for optimal coverage. In type 2 diabetes, several agents are used to increase insulin secretion and/or improve insulin receptor sensitivity. These include sulfonylurea agents (glipizide and glimepiride); meglitinide analogs (repaglinide and nateglinide); insulin sensitizers, which include biguanides (metformin) and thiazolidinediones (pioglitazone); and incretin mimetics (semaglutide and dulaglutide).

Nutrition Therapy

Nutrition management is the cornerstone of many endocrine disorders. The dietary intake of some nutrients exacerbates certain hormonal imbalances whereas adherence to a therapeutic dietary plan can represent an important component of the treatment plan. As one example, careful nutrition management is the foundation of diabetes treatment (discussed in detail in Concept 13, Glucose Regulation).

Fluid and Electrolyte Management

Some hormone imbalances or associated treatments can lead to an actual or potential for fluid and electrolyte imbalances. This is particularly true with antidiuretic hormone imbalances, hypercortisolism, aldosterone imbalances, parathyroid hormone disturbances, and as a result of insulin deficiency (diabetic ketoacidosis).[9] Thus, monitoring fluid intake and output and monitoring serum electrolytes is a central component of care for many of these conditions.

Surgery

Hypophysectomy. A hypophysectomy is the surgical removal of the pituitary gland and often an associated tumor. The most common cause of hyperpituitarism is a benign tumor within the anterior pituitary gland (pituitary adenoma).[23] This procedure may also be done when there is hypersecretion of adrenocorticotropic hormone from the pituitary gland, leading to adrenocortical hypersecretion. Common approaches for surgical removal include transfrontal, subcranial, or oronasal-transsphenoidal approaches. Irradiation and cryosurgery are alternative approaches to removing the pituitary gland.[9]

Adrenalectomy. The removal of one or both adrenal glands is a treatment option for three different types of hormone regulation problems. Adrenocortical hypersecretion and hyperaldosteronism are often caused by a benign adrenal tumor affecting the adrenal cortex. A pheochromocytoma is a catecholamine-producing tumor of the adrenal medulla and leads to excessive release of epinephrine and norepinephrine. Patients require lifelong glucocorticoid and mineralocorticoid replacement if both adrenal glands are removed. If only one gland is removed, replacement therapy is needed temporarily until the remaining adrenal gland can sufficiently increase hormone production.

Thyroidectomy. A complete or partial removal of the thyroid gland is indicated for individuals with an excessively large goiter (causing compression on the esophagus or trachea) or who do not have adequate response to pharmacotherapy with antithyroid agents or with radioactive iodine therapy. The

variations in procedures include partial thyroid lobectomy (removal of one part of a lobe), thyroid lobectomy (removal of an entire lobe), thyroid lobectomy with isthmusectomy (removal of one entire lobe and the isthmus), bilateral subtotal thyroidectomy (removal of all of one lobe, the isthmus, and a portion of another lobe), and total thyroidectomy (removal of the entire gland). The patient must be monitored for serious complications (hemorrhage, respiratory distress, hypocalcemia, tetany, thyroid storm, and laryngeal nerve damage) during the postoperative period.[23] Patients who undergo a total thyroidectomy require lifelong thyroid replacement therapy.

Parathyroidectomy. Hyperparathyroidism is often caused by a benign tumor in the parathyroid glands. Removal of one or more of the four parathyroid glands may be indicated for hyperparathyroidism. A parathyroidectomy is considered a minor procedure and is often done as same-day outpatient surgery for patients without comorbidities.[24] Because the parathyroids are located on the thyroid gland, similar concerns for postoperative monitoring apply. In addition, calcium levels are monitored to avoid hypocalcemic crisis.

Radiation

Radioactive iodine therapy is indicated for the treatment of hyperthyroidism. It is given as an oral preparation, usually in a single dose. Radioactive iodine therapy makes its way to the thyroid gland, where it destroys some of the cells that produce thyroid hormone. Radioactive iodine is completely eliminated from the body after approximately 4 weeks. The extent of thyroid cell destruction is variable; thus, the patient requires ongoing monitoring of thyroid function. If thyroid production remains too high, a second dose may be needed.[23]

Psychosocial Support

A hormonal imbalance often represents a change in an individual's lifestyle and can affect an individual's physical appearance, libido, sexual functioning, and mood. Combined, these changes can affect interpersonal relationships and self-confidence; they often require a period of time to adjust (particularly if it is a chronic condition). Patients may benefit from individual counseling and support groups as a means for effective coping.

Patient Education

The complexity of many hormonal imbalances requires significant patient education regarding diet, activity, and medications to achieve optimal disease management. Patients who undergo hormone replacement therapy must understand the need to take medications regularly, consistently, and within the dosing parameters established for their condition. Patients must also know the signs and symptoms of excessive or insufficient hormone supplements. Patients with conditions requiring specific dietary and/or fluid management must be taught how to incorporate dietary patterns into their culture and lifestyle.

INTERRELATED CONCEPTS

All body systems are affected by hormones; for this reason, all health and illness concepts are interrelated in some way. However, concepts with the closest interrelationships are presented in Fig. 12.3. **Intracranial Regulation** has a significant role in hormonal regulation because of its influence on the function of the hypothalamus and pituitary glands. Many hormonal imbalances occur as a result of brain injury or damage to glands located in the brain. Likewise, optimal intracranial regulation and cognitive function depend on normal regulation of hormones. Maintaining balance of **Fluid and Electrolytes** is highly dependent on the secretion and regulation of aldosterone and antidiuretic hormone. **Glucose Regulation** and **Nutrition** are highly dependent on the regulation of insulin and glucagon. Because of the role that glucocorticoids and catecholamines play in the stress response, the **Stress and Coping** concept is closely aligned with Hormonal Regulation. The processes of **Development** and **Reproduction** are dependent on hormones such as growth hormone, estrogen, progesterone, testosterone, luteinizing hormone, follicle-stimulating hormone, prolactin, and oxytocin.

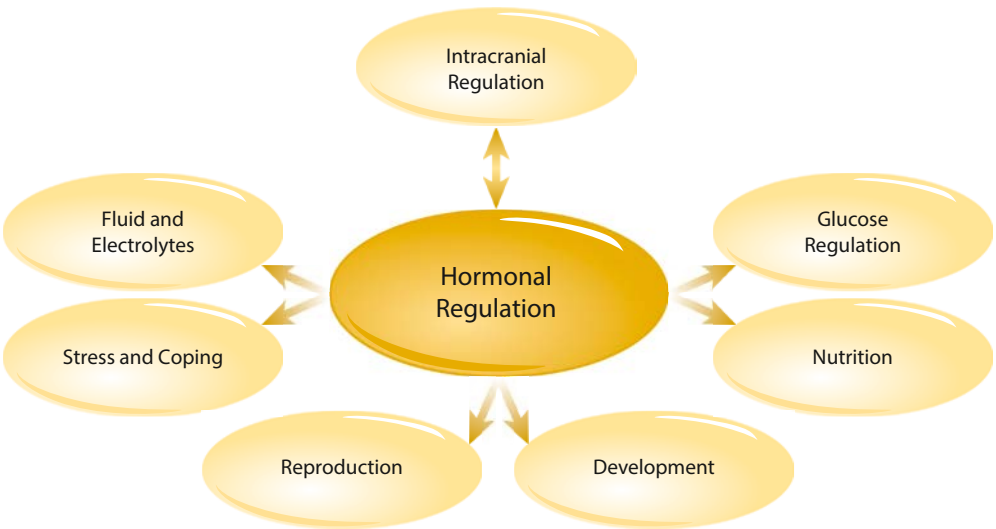

Fig. 12.3 Hormonal Regulation and Interrelated Concepts.

BOX 12.3 EXEMPLARS OF IMPAIRED HORMONAL REGULATION

Thyroid and Parathyroid
- Thyrotoxicosis (hyperthyroidism)
- Primary hypothyroidism
- Congenital hypothyroidism
- Hyperparathyroidism
- Hypoparathyroidism

Pancreas
- Type 1 diabetes
- Type 2 diabetes
- Gestational diabetes

Pituitary Gland
- Pituitary adenoma (hypopituitarism)
- Gigantism
- Acromegaly
- Hypopituitarism
- Pituitary dwarfism
- Diabetes insipidus
- Syndrome of inappropriate antidiuretic hormone

Adrenal Gland
- Hypercortisolism (Cushing syndrome)
- Hyperaldosteronism
- Adrenal insufficiency (Addison disease)
- Pheochromocytoma

CLINICAL EXEMPLARS

Because of the multiple endocrine glands and numerous hormones produced by those glands, there are many exemplars of hormonal regulation. Some endocrine disorders and subsequent hormonal imbalances are rare, whereas others are much more commonly seen. The classic exemplars are presented in Box 12.3, organized by the glands producing hormones. It is beyond the scope of this text to discuss each endocrine condition, however, information for each exemplar is easily found in pathophysiology, adult health, and pediatric textbooks and online references. A brief description of some of the most important or common exemplars is featured next.

Featured Exemplars

Hypothyroidism

Hypothyroidism refers to insufficient secretion of thyroid hormones. Typically, this is caused by reduced production of thyroid hormone by the thyroid gland, but it can also be a result of insufficient dietary intake of substances (e.g., iodide and tyrosine) that are needed for thyroid hormone production. Because thyroid hormones influence metabolic rate, thyroid insufficiency has a significant effect on systemic cellular metabolism, creating body-wide symptoms including fatigue, weight gain, depression, reduced cardiac and respiratory rates, and myxedema. The prevalence among individuals over the age of 12 years is approximately 5%, occurring most often among women between ages 30 and 60 years, with increased incidence with age. Among women hypothyroidism occurs more often in those with small stature at birth and a low body mass index during childhood.[25]

Type 1 Diabetes

Type 1 diabetes is a metabolic condition that results from the destruction of pancreatic beta cells, leading to a loss of insulin production. Insulin is a hormone that is necessary to facilitate movement of glucose into the cell for metabolic activity. Insulin deficiency is clinically associated with hyperglycemia, with significant systemic effects over time. The cause of type 1 diabetes is thought to be associated with an autoimmune response with genetic predisposition. The prevalence of type 1 diabetes is estimated at 9.5% worldwide,[26] with an estimated prevalence of 8.2% in the United States.[27] Native American, non-Hispanic Black, and Hispanic individuals have significantly higher rates of diabetes compared with non-Hispanic White and Asian American individuals.

Hypercortisolism (Cushing Syndrome)

Cushing syndrome refers to a state of chronic hypercortisolism and affects an estimated 13 per million people each year.[28] Endogenous Cushing syndrome is characterized by chronic excess glucocorticoid (cortisol) secretion from the adrenal cortex, usually caused by a pituitary gland tumor. This triggers an excessive release of adrenocorticotropic hormone, which in turn stimulates the production of cortisol. Cushing syndrome can also be caused by corticosteroids taken as medication (e.g., prednisone) over time, which is referred to as *exogenous Cushing syndrome*. Regardless of the cause, excess secretion of cortisol has a systemic effect, affecting immunity, metabolism, and fat distribution (truncal obesity), and causing reduced muscle mass, loss of bone density, hypertension, microvasculature fragility, and thinning of the skin.

Syndrome of Inappropriate Antidiuretic Hormone

Antidiuretic hormone is responsible for fluid balance and is normally secreted by the posterior pituitary gland in response to elevated plasma osmolarity. As the name suggests, syndrome of inappropriate antidiuretic hormone is a condition in which antidiuretic hormone is secreted despite normal or low plasma osmolarity, resulting in water retention and dilutional hyponatremia. In response to increased plasma volume, aldosterone secretion increases and further contributes to sodium loss.[23] A large number of clinical conditions can cause this syndrome, including malignancies, pulmonary disorders, injury to the brain, and certain pharmacologic agents.

Adrenal Insufficiency

Adrenal insufficiency occurs with insufficient secretion of adrenocortical steroids (cortisol and aldosterone). Primary adrenal insufficiency (known as Addison disease) occurs when the adrenal glands or the adrenal cortex are unable to produce and secrete sufficient hormones. In most cases Addison disease is caused by an autoimmune disorder that destroys the adrenal tissue. Secondary adrenal insufficiency occurs when there is insufficient secretion of adrenocorticotropic hormone from the pituitary gland, which is needed to signal adrenocortical steroid

release from the adrenal glands.[9] Secondary adrenal insufficiency may also occur from a sudden cessation of adrenocortical hormonal therapy.

Regardless of the cause, adrenal insufficiency results in fluid and electrolyte imbalances—particularly hyponatremia, hyperkalemia, and hypovolemia. This condition can be life-threatening if the physiological requirement for cortisol and aldosterone exceeds supply—often associated with severe physiological stress such as surgery, trauma, or sepsis.

CASE STUDY

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Case Presentation

Marci Myers, a 38-year-old female, presented at a community-based clinic with a generalized report of feeling "odd" for the past few months. Michael, a nurse practitioner, evaluated her. Marci reported that she did not have any previous medical conditions and that she takes no medications other than vitamin supplements. When Marci was asked to further describe her symptoms, she reported experiencing palpitations in her chest, shortness of breath, generalized weakness and fatigue, heat intolerance, and insomnia. She described often feeling restless and mentioned that, although she was told by her coworkers that she is irritable, in her opinion she is not; however, she just does not feel herself. When asked about recent weight loss, Marci was unsure, but admitted that her clothes might be a bit looser than they used to be and she had not been dieting. During the interview, Marci appeared somewhat restless, and a slight trembling to her hands was noted. Her vital signs were as follows: heart rate, 106 beats/min; respiratory rate, 24 breaths/min; blood pressure, 132/80 mm Hg; and temperature, 36.9°C. Marci's skin was very warm and slightly damp. The thyroid gland felt somewhat enlarged when palpated, and the rest of the examination was unremarkable. Laboratory tests for T_3, T_4, and free T_4 index were ordered to assess thyroid hormone regulation. For all three of these tests, levels were elevated. Because the nurse practitioner suspected Marci had hyperthyroidism, he referred her to an endocrinologist.

Further diagnostic testing done by the endocrinologist included thyrotropin-stimulating test (which was low), thyroid-releasing hormone stimulation test (showed no response), thyroid antibodies titer (was elevated), thyrotropin receptor antibodies test (showed high titers), and a thyroid scan (showed an enlarged thyroid gland and increased radioactive iodine uptake). These tests confirmed a diagnosis of hyperthyroidism caused by Graves disease.

Case Analysis

1. In what way does the case exemplify hormonal regulation?
2. What clinical findings exhibited by Marci are indicative of altered hormonal regulation?
3. How are the diagnostic tests described in the case consistent with what was described for assessment of hormonal regulation?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 13

Glucose Regulation

Tracye Proffitt

Glucose is fundamental to the process of human life. Glucose is the preferred energy source for most cells in the body, and the neurologic system is dependent on glucose for energy needs. When glucose metabolism becomes impaired, serious health consequences occur. Because this concept represents a foundational basis of health, the nurse must possess a solid understanding of energy and glucose regulation, including the ability to recognize and respond to situations in which this process is impaired.

DEFINITION

Glucose regulation is achieved through a delicate balance between nutrient intake, hormonal signaling, and glucose uptake by the cell. Once glucose enters the cell, it is oxidized into adenosine triphosphate (ATP) through cellular respiration. The efficiency of glucose metabolism is reflected in circulating blood glucose (BG) levels. In this concept presentation, glucose regulation is defined as *the process of maintaining optimal blood glucose levels.*

A few other key terms are important to mention. *Glycogen* is the major form of stored glucose, primarily in the liver and muscle cells. *Glycogenolysis* refers to the breakdown of glycogen to glucose. *Gluconeogenesis* refers to the process of producing glucose from noncarbohydrate sources (e.g., proteins and fats).

SCOPE

The scope of glucose regulation can conceptually be represented by the categories of normal/optimal regulation and impaired regulation throughout the life span. Normal BG levels range between 70 and 99 mg/dL in the fasting state and 100 and 140 mg/dL in the 2-hour postprandial state, otherwise referred to as *euglycemia.* Impaired regulation can be further categorized by the etiology and is reflected in abnormally high or low BG levels. *Hyperglycemia* refers to a state of elevated BG levels, generally defined as *greater than 100 mg/dL in the fasting state or greater than 140 mg/dL 2 hours postprandial. Hypoglycemia* refers to a state of insufficient or low BG levels, defined as *less than 70 mg/dL.* Fig. 13.1 shows the spectrum of glucose metabolism and regulation: hypoglycemia, euglycemia, and hyperglycemia.

NORMAL PHYSIOLOGICAL PROCESS

In the healthy individual, glucose regulation occurs with little awareness given to the process. A variety of hormones are required to maintain glucose homeostasis. When this system works efficiently, BG levels remain within a normal range, even when the individual is experiencing extreme stress.

Insulin is the only hormone that lowers BG levels. Produced in the pancreas, insulin is made by beta cells (β cells) which are found within pancreatic clusters of cells known as islets. The pancreatic β cells continuously secrete a small amount of insulin, with larger amounts secreted after food is consumed in response to rising glucose levels. Insulin lowers the BG by facilitating glucose entry into the cell. Specifically, insulin binds to insulin receptors on the cell wall, *signaling* glucose transporter molecules that help glucose enter the cell. The cells then break down glucose to produce energy, and excess glucose is stored in the form of glycogen in the liver and muscle cells.

Counterregulatory hormones oppose the action of insulin and are released to raise the BG level. These hormones work by stimulating the liver to convert glycogen to glucose (glycogenolysis) and decreasing the movement of glucose into the cell. Major counterregulatory hormones include glucagon, cortisol, growth hormone, and epinephrine.

Glucagon is one of several counterregulatory hormones released in response to cellular deficiency of glucose. Glucagon suppresses insulin and stimulates hepatic glucose production (from glycogen), resulting in elevated glucose levels. When glycogen stores are depleted, the liver converts noncarbohydrates such as lactate, amino acids, and glycerol into glucose through gluconeogenesis. Gluconeogenesis is required if BG and glycogen stores are insufficient and can also occur with stress conditions, or from use of steroid medications, with resulting increased risk of loss of muscle mass.

Other counterregulatory hormones include cortisol, growth hormone, norepinephrine, and epinephrine. Counterregulatory hormones all lead to utilization of glycogen stores, and these

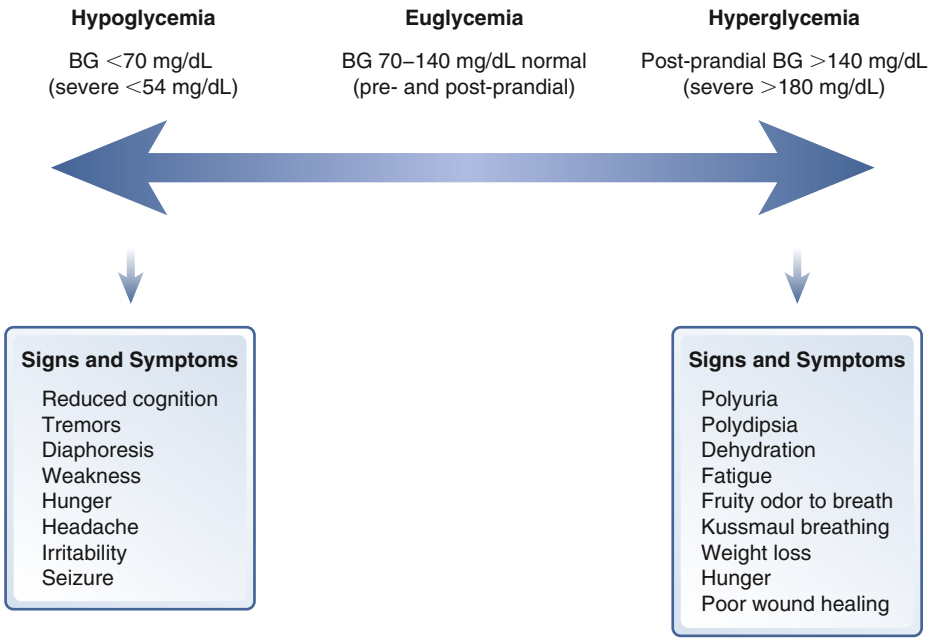

FIG. 13.1 Scope of Glucose Regulation.

hormones are also increased with stress-related conditions—both physical (e.g., pain, illness, and injury) and emotional—and are, therefore, often referred to as stress hormones.

VARIATIONS AND CONTEXT

Variations in glucose regulation occur when glucose-regulating hormones are either deficient or excessive or when production is not balanced with BG needs. An impairment of glucose regulation results in either too much or insufficient circulating BG.

Hyperglycemia

Hyperglycemia occurs as a result of insufficient insulin production or secretion, excessive counterregulatory hormone secretion, or deficient hormone signaling. The word *diabetes* means "sweet urine" because of the high level of glucose in urine (glycosuria) when BG levels remain high. Thus, *diabetes mellitus* describes a group of disorders characterized by chronic hyperglycemia and disturbances in carbohydrate, protein, and fat metabolism.

Insufficient Insulin Production/Secretion

Insulin is produced, stored, and released by pancreatic β cells (located in pancreatic islets). Damage or destruction of the β cells results in insufficient or cessation of insulin secretion. Insufficient insulin secretion results in a hyperglycemic state because glucose is unable to enter the cells for cellular metabolism. Damage to the β cells is usually caused by an autoimmune response with genetic disposition or can occur secondarily from other diseases such as pancreatitis or pancreatic cancer.

Deficient Hormone Signaling

The term *insulin resistance* refers to a state in which the body cells respond abnormally to the signaling action of insulin. In other words, there is not a problem with insulin supply but with how the cell responds to insulin signaling. Insulin resistance may be due to a reduction of insulin receptors or glucose transporter molecules,[1] resulting in sluggish glucose uptake by the cell. The pancreas overproduces insulin to compensate for reduced cellular glucose uptake, resulting in hyperinsulinemia. When insulin resistance persists for long periods of time, the insulin producing capacity of the pancreas is exhausted and hyperglycemia ensues.[2]

Excessive Counterregulatory Hormone Secretion

Excessive secretion of any of the counterregulatory hormones can result in hyperglycemia. These include glucagon (previously described) and cortisol, a hormone that raises BG through gluconeogenesis. Causes of increased counterregulatory hormone secretion include physiologic (e.g., acute illness, injury, pain, and sleep deprivation) and emotional stress, as well as adverse medication effects (particularly with high doses of corticosteroids) and Cushing disease. An excess of cortisol also contributes to insulin resistance (described previously).

Hypoglycemia

Hypoglycemia is a state of low glucose levels and typically occurs as a result of insufficient nutritional intake, adverse reaction to medication, excessive exercise, or as a consequence of disease states. Often, hypoglycemia occurs due to a combination of these factors.

Insufficient Nutritional Intake

Malnutrition leads to depletion of glucose stores in the liver and adipose tissue and, thus, prevents hepatic mechanisms for maintenance of normal glucose levels. In the absence of sufficient glucose, the body compensates by breaking down fat stores into fatty acids and ketone bodies to provide energy. Prolonged starvation and malnutrition can eventually lead to life-threatening hypoglycemia.

Adverse Reaction to Medication

Hypoglycemia most often occurs among those taking exogenous insulin or medications that increase endogenous insulin production. Once an individual requires insulin therapy to maintain glucose control, creating a physiologic insulin replacement regimen while avoiding hypoglycemia can be difficult. The highest risk of hypoglycemia is during the peak of the medication's action, particularly when a meal is delayed or missed.

Excessive Exercise

The work of muscle contraction requires energy. Initially, this energy is derived from glucose stored in muscle cells as glycogen; however, the glucose stores are quickly depleted. Then, glucose from the circulation and hepatic glucose stores is utilized for energy, lowering the BG level. During postexercise recovery, BG levels may decrease again as the muscle cells replenish glycogen stores with additional glucose from the circulation.

CONSEQUENCES

A number of significant physiologic consequences are associated with poor glucose regulation. Hyperglycemia and insulin resistance are toxic, proinflammatory states, causing cellular changes, cell death, and various long-term health problems. Likewise, hypoglycemia can impair neurologic system function, which can be dangerous for the individual. The consequences of hyperglycemia and hypoglycemia are discussed separately.

Physiologic Consequences of Hyperglycemia

Insulin Resistance

Insulin resistance is a proinflammatory state, thus contributing to atherogenesis and plaque formation.[3] Insulin resistance is also associated with increased cancer risk, with hyperinsulinemia appearing to act as a cellular growth factor.[4] Hypertension is twice as common in those with diabetes compared with those who do not have diabetes, with both sharing a common mechanism of high oxidative stress and inflammation.[5] Hyperinsulinemia causes hypertension through its role in reducing elasticity of blood vessels.[6] Insulin resistance may alter glucose uptake in the cerebrum, thus increasing the chance of impaired memory in older adults.[7] Other conditions associated with insulin resistance and proinflammatory states are nonalcoholic steatohepatitis and sleep apnea.[8]

Angiopathy

Individuals with long-standing or chronic hyperglycemia are at risk for of developing significant physiologic complications due to angiopathy (damage to blood vessels). Chronic BG elevation damages the basement membrane of small blood vessels and impairs tissue oxygenation. These microvascular effects lead to end organ disease, including damage to the eye (retinopathy and vision loss) and the kidney (chronic kidney disease that can lead to end-stage renal disease).

Chronic hyperglycemia also damages medium and larger blood vessels, leading to coronary heart disease, cerebrovascular disease, or peripheral arterial disease. Collectively these are referred to as atherosclerotic cardiovascular disease (ASCVD), and they are the leading cause of morbidity and mortality for individuals with diabetes.[9] The vascular damage to blood vessels in the lower extremities leads to peripheral vascular disease, increasing the risk of foot ulcers, chronic wound infection, and amputation.

Peripheral Neuropathy

Hyperglycemia is toxic to nerves, resulting in nerve damage and leading to peripheral neuropathy causing symptoms such as burning and numbness in the lower extremities. Once protective sensation is lost in the feet, the risk of foot ulcers increases. Peripheral neuropathy is seen with prediabetes and may be the presenting symptom of impaired glucose utilization.[10]

Infection

Hyperglycemia is associated with an increased risk of infection due to impairments in the immune response. The impairments include defects in the mobilization of neutrophils, phagocytosis, and cell-mediated immunity. Additionally, some pathogens thrive in body fluids with high glucose concentrations. Common infections include skin and wound infections, urinary tract infections, and superficial fungal infections.

Fluid, Electrolyte, and Acid–Base Imbalances

A potential consequence of severe hyperglycemia is dehydration because of a water deficit resulting from osmotic diuresis. Hyperosmolar hyperglycemic syndrome (HHS) involves severe hyperglycemia (>600 mg/dL), which leads to osmotic diuresis and dehydration. It is most common in older adults with type 2 diabetes.[11] The incidence of HHS is also increasing in children with type 2 diabetes, directly correlating with increasing type 2 diabetes rates in children.[12] Diabetic ketoacidosis (DKA) is a complication that most commonly occurs in type 1 diabetes and is characterized by hyperglycemia and acidosis. In DKA, an absolute insulin deficiency results in lipolysis (breakdown of fat) with subsequent ketone body production causing metabolic acidosis.

Physiologic Consequences of Hypoglycemia

Because glucose is the primary fuel source for the brain, hypoglycemia causes symptoms such as drowsiness, confusion, seizures, and coma. Additionally, hypoglycemia stimulates the release of counterregulatory hormones resulting in autonomic nervous system activation. Activation of the autonomic nervous system produces symptoms such as tremors, anxiety, sweating, and palpitations. Recurrent hypoglycemia can lower the glucose level that stimulates the release of counterregulatory hormones, resulting in delayed symptom onset. Additionally, recurrent hypoglycemia increases the risk of chronic cognitive impairment and accelerated cognitive decline in older adults.[13,14] The risk of fatal hypoglycemia is estimated to be 4% to 10% in those with type 1 and type 2 diabetes.[15]

Recurrent hypoglycemia also leads to hypoglycemia unawareness, a condition associated with autonomic neuropathy in which the counterregulatory hormonal response is blunted. The spectrum of diabetic autonomic neuropathy also includes orthostatic hypotension, resting tachycardia, gastroparesis, constipation, diarrhea, erectile dysfunction, neurogenic

bladder, and alterations in sweat gland activity.[16] Hypoglycemia occurs more frequently in those with type 1 diabetes and is a challenge across the life span.[17]

RISK FACTORS

Impaired glucose regulation can occur in any individual, at any point in the life span, regardless of age, sex, race, or ethnicity. However, there are well-known risk factors for impaired glucose regulation.

Populations at Risk

Pregnant Persons

The hormonal changes associated with pregnancy, specifically hormones produced by the placenta, cause insulin resistance. This insulin resistance increases the risk of hyperglycemia, especially postprandial hyperglycemia. Pregnant individuals with prediabetes or multiple risk factors for type 2 diabetes are screened at the first prenatal visit, and all pregnant persons are screened for gestational diabetes between 24 and 28 weeks of gestation.[18]

Infants

The risk of hypoglycemia shortly after birth is higher in large-for-gestational-age infants and for infants born to mothers who had diabetes during pregnancy.[19] Neonatal hypoglycemia is attributed to hyperinsulinemia that occurs in response to elevated glucose levels in utero. Small for gestational age and premature infants are also at risk of hypoglycemic states because of increased energy needs and insufficient glycogen stores.

Older Adults

Older adults are at greater risk for impaired glucose metabolism and hyperglycemia due to an increase in visceral fat and associated reduction in lean muscle mass, where most glucose is metabolized. Many older adults also have reduced insulin production and insulin resistance.[20]

Racial/Ethnic Groups

Certain racial and ethnic populations have greater genetic predisposition to insulin resistance, leading to a higher risk for type 2 diabetes, especially American Indians/Alaska Natives (age-adjusted percentile of 14.7%), African Americans (11.7%), Hispanic/Latino (12.5%, with Puerto Ricans and Mexican Americans having the highest rate), and Asian Americans (9.2%) compared with 7.5% among whites.[21] These racial and ethnic disparities may also be related to modifiable risk factors.[22] There is a growing trend of increased diabetes prevalence in societies less burdened with infectious disease. Other ethnic groups, particularly those of Northern European and Canadian descent, have a genetic tendency for autoimmune forms of diabetes.[23] Individuals with type 1 diabetes also have a higher frequency of autoimmune diseases, such as celiac disease, adrenal insufficiency, pernicious anemia, vitiligo, and autoimmune thyroid disorders.[24]

Individual Risk Factors

Genetic Risk Factors

Research is rapidly expanding our understanding of the genetics of diabetes. Currently, there are at least 143 known genetic markers, including *HLA* genes, associated with the risk of type 2 diabetes.[25] Insulin resistance is the common feature associated with metabolic syndrome and type 2 diabetes. A family history of type 2 diabetes, obesity, and low high-density lipoprotein (HDL) cholesterol are risk factors for insulin resistance and type 2 diabetes.[18]

Modifiable Factors

While there are clear genetic links to diabetes, there are a number of modifiable risk factors that promote and worsen insulin resistance. One is a diet high in saturated and trans fats and ultra-processed foods with a low fiber intake.[26] Excess caloric intake, particularly carbohydrates, adversely affects glucose metabolism, regardless of the presence of insulin resistance or type 2 diabetes. Obesity and sedentary lifestyles contribute to insulin resistance as well.[27]

Medications

Many medications used to treat health conditions are known to affect glucose regulation, which can place an individual at risk for hyperglycemia or hypoglycemia. The most common medications that affect glucose regulation include insulin, oral hypoglycemic agents, corticosteroids, estrogen, angiotensin-converting enzyme (ACE) inhibitors, β-blockers, potassium-depleting diuretics, bronchodilators, antipsychotics, and many antibiotics.

ASSESSMENT

History

The relevant history pertaining to glucose homeostasis includes personal medical history, current medications, social history, family history, and a review of systems. In each assessment area, the nurse considers data consistent with actual or potential problems with glucose regulation. Central obesity and diabetes are conditions to note in a personal or family history. As previously mentioned, certain medications carry a greater risk of impaired glucose regulation.

The nurse should recognize common clinical manifestations of impaired glucose regulation (Table 13.1). Individuals may or may not have symptoms of hyperglycemia. Individuals experiencing significant hyperglycemia may display *polyphagia* (excess hunger) due to cells not receiving adequate glucose, as well as *polydipsia* (excess thirst) and *polyuria* (excess urination) due to osmotic diuresis.

The review of systems may reveal symptoms suggestive of complications associated with long-standing hyperglycemia. Visual changes may indicate retinopathy. Those with peripheral neuropathy may report reduced or pins-and-needles sensation paresthesia in the lower extremities. Nonhealing wounds or generalized lower extremity pain is suggestive of poor peripheral perfusion. Individuals with insulin resistance and type 2 diabetes may experience sleep disturbances, which are associated with poor glycemic control.[28] Managing diabetes can be stressful, and some individuals suffer from "Diabetes Distress," which refers to emotional distress related to living with diabetes.[29] The risk of depression is also higher in those with diabetes, which may include symptoms such as lack of interest, feelings of

TABLE 13.1 Comparison of Clinical Presentation of Hypoglycemia and Hyperglycemia

	Hypoglycemia	Hyperglycemia
Symptoms	Symptoms related to degree of hypoglycemia and can include weakness, dizziness, headache, hunger, blurred vision, difficulty concentrating, feeling shaky, palpitations	No specific symptoms for elevated blood glucose, but symptoms may be associated with dehydration or acidosis and may include nausea, vomiting, abdominal cramps, fatigue, excessive hunger (polyphagia), excessive thirst (polydipsia)
Mental status	Anxiety, irritability, confusion, seizures, unconsciousness, coma	Can range from alert to confused and coma, particularly in untreated ketoacidosis
Skin	Diaphoresis, cool, clammy	Warm, moist
Respiratory/cardiovascular	Tachycardia; no change in respirations	Deep, rapid respirations; acetone odor to breath; tachycardia if dehydrated
Other	Muscle tremors, normal hydration, no ketones	Dehydration, polyuria, ketones

FIG. 13.2 Acanthosis Nigricans is a Physical Exam Finding Frequently Seen in Individuals Who are Insulin Resistant. (Courtesy Dr. Ann Brown, Duke University School of Medicine.)

sadness or worthlessness, difficulty with sleep, appetite or weight changes, suicidal thoughts, and difficulty concentrating.[30]

Examination Findings

The examination should include vital signs and anthropometric measurements such as height and weight to determine body mass index and waist/hip measurements to determine waist-to-hip ratio. Elevated blood pressure, obesity, and central obesity are associated with insulin resistance.

Several physical findings are common among individuals with long-standing states of impaired glucose metabolism. Acanthosis nigricans, a condition characterized by velvety hyperpigmented plaques in the skin folds (especially the posterior neck), is associated with insulin resistance and hyperinsulinemia (Fig. 13.2). Acrochordons (skin tags), commonly found on the neck and axillae, are also thought to be related to insulin resistance.

The lower extremities should be examined for evidence of peripheral artery disease, a condition linked to insulin resistance, characterized by weak or absent pulses, prolonged capillary refill, hair loss, and chronic wounds. A foot exam includes inspection of skin for blisters, ulcers, skin lesions, nail abnormalities, and excessive callusing. Sensation and motor strength of the extremities should be assessed to evaluate for neuropathy. Assessing visual acuity and inspection of intraocular structures with an ophthalmoscope may provide evidence of possible retinopathy, although dilated eye exams are recommended for screening purposes.

Diagnostic Tests

Diagnostic testing is an essential component of the assessment for impairments in glucose regulation and metabolism. Laboratory tests can assist in determining the etiology of impaired glucose metabolism, measuring and assessing BG management, and detecting and evaluating consequences of impaired glucose metabolism.

Blood Glucose Testing

Measurement of BG is widely used for screening and monitoring glucose metabolism. A fasting glucose level greater than 100 and less than 126 mg/dL indicates prediabetes or impaired fasting glucose, and a random BG measurement of 200 mg/dL or greater with classic signs and symptoms of hyperglycemia indicates diabetes. The glucose tolerance test (GTT) is the most sensitive measure of glucose metabolism and is the recommended test to screen for diabetes during pregnancy.

Glycosylated hemoglobin (also known as the A1C) is a laboratory measurement reflecting the average BG over the previous 2 to 3 months. The A1C is used for diagnostic screening and monitoring of BG management, and a reading of 6.5% or greater is indicative of diabetes. The A1C is not as sensitive as the GTT for diagnosing diabetes. Conditions that alter the life span of red blood cells (e.g., end-stage renal disease, splenomegaly, certain anemias, and some hemoglobin variants) can interfere with the measurement.[31] Racial differences have also been noted, with higher A1C measurements found in Blacks and African Americans compared with Whites with equivalent glucose levels.[32] An A1C of 7.0% or less is associated with a reduced risk of diabetes complications and is the recommended goal for most individuals with diabetes.[33]

Antibody Testing

Autoantibody testing is sometimes used to distinguish between type 1 and type 2 diabetes. However, there is no definitive test that distinguishes the two types. A common test checks for autoantibodies to glutamic acid decarboxylase 65 (GAD65), indicating type 1 diabetes. A C-peptide test may also be performed. The pancreas produces insulin and C-peptide simultaneously in

almost equal amounts; thus, a high C-peptide is indicative of hyperinsulinemia and suggests type 2 diabetes.

Lipid Analysis

Lipid abnormalities are often found in individuals with impaired glucose regulation and contribute to ASCVD risk. The most common lipid assessments include measurements of total cholesterol, HDL cholesterol, and triglycerides. From these results, the low-density lipoprotein (LDL) cholesterol level is calculated. The goal LDL cholesterol level is based on cardiovascular risk factors. Triglyceride levels are generally a reflection of glycemic control, meaning that when glucose levels are high, triglycerides will also be high. Increased triglyceride levels and low HDL cholesterol levels are associated with insulin resistance.

Renal Function Tests

An early indication of renal disease associated with diabetes is microscopic protein loss in the urine. Urinary albumin and serum creatinine are used to evaluate renal function. The estimated glomerular filtration rate (eGFR) is also calculated. Significant loss of albumin into the urine (>300 mg/g creatinine) and an eGFR of less than 60 are associated with diabetic kidney disease and an increased risk of end-stage renal disease.

CORE COMPETENCIES

Glucose Regulation

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to Glucose Regulation.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to Glucose Regulation.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to Glucose Regulation for individuals, communities, or populations.
- Implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to Glucose Regulation.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to Glucose Regulation.
- Demonstrate clinical judgment founded on broad knowledge of Glucose Regulation.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention measures for optimal glucose regulation center around a healthy lifestyle. The Diabetes Prevention Program found that those with prediabetes could reduce the progression to type 2 diabetes by 58% through a weight reduction of at least 7% and 150 minutes of physical activity per week, such as brisk walking. Metformin can also reduce the risk of diabetes and is recommended for individuals with a history of gestational diabetes and adults aged 25 to 59 with prediabetes and a BMI ≥35 kg/m^2.[34]

Maintaining Optimal Body Weight

Obesity is directly linked to insulin resistance and the development of diabetes. In 2016, 18.4% of children ages 6 to 11 years were classified as obese, as were 20.6% of those ages 12 to 19 years.[35] Additionally, 42.4% of adults in the United States were classified as obese in 2018.[36] The increase in diabetes prevalence correlates with increased overweight and obesity rates and sedentary lifestyles.

Exercise

Exercise improves insulin resistance and cellular metabolism by increasing glucose transporter type 4 (GLUT4) translocation within muscle cells,[37] facilitating glucose diffusion into the cell and lowering glucose levels. The American Diabetes Association recommends moderate-intensity physical activity for at least 150 minutes per week. Activity should consist of aerobic exercise and may also include resistance training.[38]

Diet

Nutrition plays an important role in the prevention and management of diabetes. The *2020-2025 Dietary Guidelines* should be promoted; these emphasize consuming a diet high in whole grains, fruits, and vegetables of all types, and legumes/beans, along with fat-free or low-fat milk and a variety of lean protein sources.[39] There is no single eating pattern for diabetes, but nonstarchy vegetables and whole foods are encouraged, while added sugars and refined grains should be minimized. A sodium intake of less than 2300 mg/day can help lower blood pressure and reduce the risk of cardiovascular disease.[40]

Secondary Prevention (Screening)

Secondary prevention refers to the early detection of disease through screening. Asymptomatic adults aged 35 to 70 years who are overweight or obese should be screened for prediabetes and type 2 diabetes every 3 years.[41] Screening for gestational diabetes should occur at 24 weeks of gestation or later for asymptomatic pregnant persons.[42] There are no specific recommendations for population-based screening for hypoglycemia.

For individuals with diabetes, A1C measurements should be performed at least twice per year or every 3 months if not meeting glycemic targets.[33] Several regular screening measures are also recommended for early detection of complications. The American Diabetes Association recommends annual renal function and lipid tests and annual dental, foot, and dilated eye examinations. Individuals with type 1 diabetes are at higher risk for other autoimmune processes, so thyroid function is monitored yearly.[43]

Collaborative Interventions

Managing impaired glucose regulation requires an interdisciplinary approach, with glycemic control as the central goal to which all interventions are geared. The Diabetes Control and Complications Trial (DCCT) was a landmark controlled clinical trial that was among the first to find that glycemic control significantly reduces diabetes-related complications in persons with type 1 diabetes.[44] Controlled trials of individuals with type 2 diabetes have noted similar findings.[45] These studies informed the development of the current standards of care, which aim to prevent complications and improve quality of life. Specific collaborative interventions include education on self-management, glucose monitoring, nutrition therapy, and pharmacologic therapy.

Self-Management Education

Diabetes self-management education and support (DSMES) programs promote informed decision-making, self-care behaviors, problem-solving, and collaboration with the healthcare team. Factors that influence self-care are addressed in the DSMES programs, including health beliefs, knowledge, physical ability, emotional health, family and financial support, and health literacy. These programs are associated with improved self-care behaviors, better glycemic control, improved quality of life, and reduced mortality.[38]

Monitoring and Managing Blood Glucose

Managing glucose levels requires regular monitoring. Two approaches to glucose monitoring include self-monitoring of blood glucose (SMBG) and A1C.

Self-monitoring of blood glucose. SMBG is performed with a standard glucose meter or a continuous glucose monitor (CGM) that measures the glucose level every 5 minutes. Standard meters measure capillary glucose levels, and CGM devices measure interstitial glucose levels. These devices are calibrated to be equivalent to plasma glucose with a variance of approximately 10% to 15%. Because glucose levels fluctuate throughout the day, SMBG assists with decisions related to carbohydrate intake and medications. Patient or caregiver teaching is essential for accurate readings, and logging of glucose levels is encouraged so that the results can be shared with the healthcare provider. Many meters allow results to be downloaded to a computer or wirelessly transferred to smartphones or tablets. Glucose logs help identify trends and aid glucose management.

Monitoring glycosylated hemoglobin (A1C). A person with prediabetes or diabetes can benefit from regular monitoring of A1C levels to assess glycemic control. The goal A1C for most individuals is 7.0% or less, although less stringent goals of 7.5% to 8.0% may be appropriate for older adults and those with limited life expectancy, risk of severe hypoglycemia, and hypoglycemia unawareness.[33,46]

Correcting hypoglycemia. One of the ongoing risks associated with glucose-lowering agents is hypoglycemia, defined as *a glucose level below 70 mg/dL*. The *15/15 rule* is recommended for treating hypoglycemia and involves consuming 15 g of quick-acting carbohydrate and retesting the glucose level in 15 minutes to determine effectiveness. A 15-g dose of a quick-acting carbohydrate will usually raise the glucose level to a normal level without inducing hyperglycemia (known as rebound hyperglycemia). Some examples of quick-acting, 15-g portions of carbohydrate are shown in Box 13.1. If hypoglycemia persists after initial treatment, the process of consuming 15 g of quick-acting carbohydrate followed by a repeat glucose check after 15 minutes is repeated until euglycemia is achieved. The healthcare provider should be notified if hypoglycemia continues after two to three doses of carbohydrates. An exception to the 15/15 rule is severe hypoglycemia, occurring when the individual is not alert enough to swallow. In this instance either glucagon (subcutaneous, intramuscular, or nasal) or intravenous dextrose is given. Glucagon may induce nausea and vomiting, so the individual should be placed in a side-lying position to reduce the risk of aspiration.

BOX 13.1 Optimal 15 Gram Carbohydrates for Treatment of Hypoglycemia

- ½ cup regular soda or juice
- 1 cup low-fat or nonfat milk
- ½ ampule of dextrose 50% (D50)
- 1 mg of glucagon
- 3 to 4 glucose tablets
- 1 tablespoon honey
- 4 to 6 pieces hard candy
- 15 jellybeans

Nutrition Therapy

Nutrition therapy is essential in the management of impaired glucose metabolism. Healthcare providers should refer those with diabetes to a registered dietician nutritionist with experience in diabetes-specific medical nutrition therapy. Macronutrient goals should be individualized based on glycemic goals, current eating habits, and personal preferences. Many people with diabetes have similar macronutrient goals as the general population, including 45% of calories from carbohydrates, 36% to 40% from fats, and the remainder from protein. For individuals with diabetes who are overweight or obese, weight loss is recommended. Two common meal plans are the plate method and carbohydrate counting. The plate method provides recommendations for food portions using a 9-inch plate. Half of the plate is for nonstarchy vegetables, ¼ of the plate is for protein, and ¼ of the plate is for carbohydrates. Carbohydrate counting is often used in those with type 1 diabetes on intensive insulin regimens and involves tracking how much carbohydrate is consumed at each meal. Both of these meal plans have been found to be effective in improving the A1C level.[38]

Pharmacologic Agents

The American Diabetes Association and the European Association for the Study of Diabetes emphasize an individualized approach to medication therapy for impaired glucose regulation. When choosing medications, factors such as age, weight, glycemic target, comorbidities, personal preferences, and cost should be considered.[47,48]

Oral hypoglycemic agents. Oral hypoglycemic agents are used to treat type 2 diabetes and help manage glucose levels through a number of mechanisms. Common agents include:

- *Insulin sensitizers:* The first-line oral agent for type 2 diabetes is metformin, a biguanide. It decreases hepatic glucose production, increases insulin sensitivity, and does not cause weight gain. Thiazolidinedione medications also increase insulin sensitivity but are rarely used due to adverse effects.
- *Insulin secretagogues:* Sulfonylureas and the shorter-acting Meglitinides increase pancreatic insulin production; therefore, hypoglycemia and weight gain may occur.
- *Incretin agents:* Incretin hormones increase insulin synthesis and decrease hepatic glucose production. Glucagon-like peptide-1 (GLP-1) is an incretin hormone, and dipeptidyl peptidase-4 (DPP-4) inactivates GLP-1. The GLP-1 receptor agonists and DPP-4 inhibitors reduce postprandial glucose levels and do not cause weight gain.

- *SGLT-2 inhibitors:* The sodium-glucose cotransporter 2 (SGLT-2) inhibitors lower glucose levels by increasing the amount of glucose excreted in the urine. Adverse effects include dehydration and orthostatic hypotension due to osmotic diuresis.

Insulin. Normal insulin secretion consists of a continuous secretion of very small amounts of insulin throughout the day and night (basal), with boluses of insulin secretion at mealtimes (prandial). Individuals with type 1 diabetes often require basal and mealtime insulin to achieve euglycemia; this mimics the normal pattern of insulin secretion. The addition of basal insulin can help the person with type 2 diabetes achieve euglycemia if oral agents alone are not effective. In addition to hypoglycemia, a major side effect of insulin therapy is weight gain. Insulin allows glucose to enter the cells, and cells can get more glucose than they need when more calories are consumed than needed. The excess glucose is stored as fat and causes weight gain. A variety of insulin preparations, including the onset, peak, and duration of action are shown in Table 13.2. Many types of insulin replacement therapy are used:

- *Basal insulin therapy:* Basal insulin therapy may include intermediate-acting insulin, such as NPH insulin, or long-acting insulin, such as glargine, detemir, or degludac insulin. Long-acting insulins have minimal or no pronounced peak and are typically preferred over NPH insulin.
- *Mealtime insulin therapy:* Mealtime insulin therapy may include short-acting insulin, such as regular insulin, or rapid-acting insulin, such as lispro, aspart, and glulisine insulin.
- *Premixed preparations:* Premixed insulin preparations combine an intermediate- or long-acting insulin with a rapid- or short-acting insulin in the same vial. Examples of mixed insulin include 70% NPH/30% regular, 50% NPL/50% Lispro, and 70% NPA/30% Aspart.

TABLE 13.2 Characteristics of Various Insulin Preparations

Insulin	Onset of Action	Peak of Action	Duration of Action
Rapid-acting			
Lispro, aspart, glulisine†	5–15 minutes	45–75 minutes	3–5 hours
Inhaled regular	<15 minutes	50 minutes	2–3 hours
Short-acting			
Regular†	30–60 minutes	2–4 hours	6–8 hours
Intermediate-acting			
NPH‡	About 2 hours	4–12 hours	18–26 hours
Long-acting			
Glargine	3–4 hours	No peak	24 hours
U–300 insulin glargine	6 hours	No peak	24 hours
Detemir	1–2 hours	No peak	14–24 hours
Degludec	1–2 hours	No peak	>40 hour
Premixed			
70% NPH/30% regular	30–60 minutes	Dual (NPH & R)	10–16 hours
50% NPL/50% lispro	30–60 minutes	Dual (NPL & lispro)	10–16 hours
75% NPL/25% lispro	5–15 minutes	Dual (NPL & lispro)	10–16 hours
70% NPA/30% aspart	5–15 minutes	Dual (NPA & aspart)	10–16 hours
70% Degludec/30% aspart	15 minutes	Dual (degludec & aspart)	> 40 hours

* Times are approximate, assume subcutaneous administration, and may vary with injection technique and factors influencing absorption.
†Lispro and aspart are also available in premixed forms with intermediate-acting insulins.
‡NPH also exists in premixed form (NPH/regular).
NPA = neutral protamine aspart; NPH = neutral protamine Hagedorn; NPL = neutral protamine lispro.
From Brutsaert, E.F. (2020). Drug treatment of diabetes mellitus. In *Merck Manal Professional Version*. Merck & Co., Inc. Retrieved June 3, 2022, from http://www.merckmanuals.com/professional.

Statin agents. Statin medications are used in addition to lifestyle therapy for the primary prevention of ASCVD in adults aged 40 to 75 years with diabetes. The statin medication may also be used in younger individuals depending on risk factors. Evidence strongly suggests statin agents reduce the rate of myocardial infarction, stroke, and death in those with diabetes.[49] It is thought that statin medications exert antiinflammatory effects that confer additional cardiovascular risk reduction beyond their LDL-lowering properties.[50]

Glucose Management in Hospital Settings

Glucose control in the hospitalized patient has taken on new importance due to a landmark clinical trial that found a significant reduction in mortality with a target BG of 80 to 110 mg/dL. However, follow-up studies found that risk reduction can be achieved with a BG target of 140 to 180 mg/dL while also decreasing the risk of life-threatening hypoglycemia.

In the critical care setting, continuous insulin infusions are most effective in treating hyperglycemia. In other acute care settings, it may be possible to continue a patient's home insulin dosage or oral medication. However, insulin is preferred if the patient has decreased oral intake or if the home medications are being held. In these instances, basal insulin is preferred with bolus insulin given at mealtime if eating or as needed for acute hyperglycemia (also known as sliding scale). As needed or sliding scale insulin as monotherapy in hospitalized patients is not recommended.[51]

INTERRELATED CONCEPTS

Glucose regulation affects and is affected by most, if not all, physiologic processes. As the primary energy substrate, all life processes are dependent on normal glucose metabolism and regulation. Fig. 13.3 shows some of the most important interrelated concepts.

Hormonal Regulation is shown as a close interrelated concept because of the significant influence that hormones have on glucose regulation. Proper **Nutrition** and regular physical activity (**Mobility**) are needed for optimal glucose regulation and management of conditions in which regulatory mechanisms are impaired. Long-term consequences of hyperglycemia lead to micro- and macrovascular changes (**Perfusion**), poor wound healing (**Tissue Integrity**), impaired immune function (**Immunity**), reduced renal function (**Elimination**), and changes in vision and peripheral sensation (**Sensory Perception**).

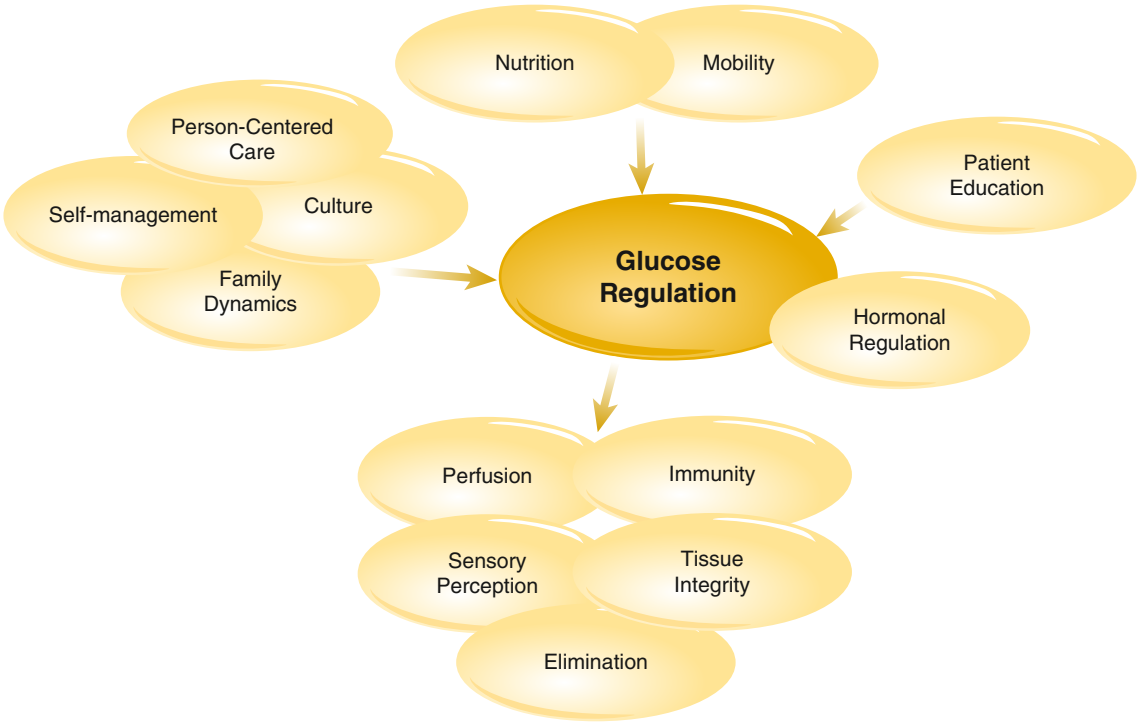

FIG. 13.3 Glucose Regulation and Interrelated Concepts.

BOX 13.2 EXEMPLARS OF IMPAIRED GLUCOSE REGULATION

Hyperglycemia

- Conditions of excess counterregulatory hormones: Cushing syndrome
- Cystic fibrosis
- Diabetic ketoacidosis
- Hyperosmolar hyperglycemic nonketotic syndrome
- Type 1 diabetes
- Type 2 diabetes
- Overcorrection of hypoglycemia
- Rebound hyperglycemia ("Somogyi effect")
- Corticosteroid therapy
- Gestational diabetes
- Insulin resistance
- Polycystic ovary syndrome
- Hemochromatosis
- Pheochromocytoma
- Pancreatitis
- Stress response

Hypoglycemia

- Addison disease
- Insulin treatment
- Gastroparesis
- Glycogen storage diseases
- Prematurity
- Starvation
- Large for gestational age infant
- Liver failure
- Nesidioblastoma
- Insulinoma

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The concept **Person-Centered Care** describes an approach that optimizes the individual and family engagement in the management of conditions associated with glucose regulation. The concepts **Family Dynamics**, **Self-Management**, and **Culture** influence the behavioral changes needed for optimal health promotion or disease management. Family relationships can suffer when attempts to regulate the diet of one individual adversely affect mealtime for other family members, resulting in mealtime-associated stress. **Patient Education** is a cornerstone of treatment and has a tremendous effect on outcomes for those with impaired glucose regulation.

CLINICAL EXEMPLARS

Although much of the attention in this concept presentation has focused on diabetes, glucose regulation represents a number of other clinical exemplars characterized by hyperglycemic and hypoglycemic states and are presented in Box 13.2. Several of these exemplars are briefly featured here.

Featured Exemplars

Type 2 Diabetes Mellitus

Type 2 diabetes mellitus is characterized by insulin resistance and β cell failure resulting in hyperglycemia. Chronic hyperglycemia damages blood vessels and nerves, leading to the complications of retinopathy, nephropathy, neuropathy, and cardiovascular disease. Previously thought to predominantly occur in adults, type 2 diabetes is now more common in children and adolescents due to increasing overweight and obesity rates in these age groups. Ninety-five percent of individuals with diabetes have type 2 diabetes.

Type 1 Diabetes Mellitus

Type 1 diabetes mellitus is an autoimmune disorder in which the body's immune system destroys the β cells in the pancreas, resulting in absolute insulin deficiency. These individuals require lifelong exogenous insulin replacement therapy. Although it is more common in children and adolescents, approximately 5.6% of newly diagnosed diabetes in adults is type 1.[52] Historically, most individuals with type 1 diabetes were thin or normal weight, but overweight and obesity are becoming more common.[53]

Polycystic Ovary Syndrome

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in females of reproductive age. PCOS is characterized by infrequent menses (longer than 35 days apart) and signs of elevated androgen levels (hirsutism, acne, and male pattern hair loss). Infertility is common due to the lack of regular menses caused by anovulation. Individuals with PCOS are insulin resistant, and the risk for type 2 diabetes increases for overweight or obese persons with PCOS; therefore, diabetes prevention efforts in this population are crucial.[54]

Diabetic Ketoacidosis

Diabetic Ketoacidosis (DKA) is an acute complication resulting from insulin deficiency. Infection and missed insulin are the most common causes; however, DKA may also be the presenting symptom in new type 1 diabetes. The combination of hyperglycemia and ketosis leads to dehydration and acidosis. DKA predominantly occurs in type 1 diabetes. Fluid resuscitation, intravenous insulin, and electrolyte replacement are the mainstays of treatment.

Hyperosmolar Hyperglycemic Syndrome

Hyperosmolar hyperglycemic syndrome (HHS) is an acute complication characterized by extreme hyperglycemia, resulting in dehydration and hyperosmolarity. It is less common than DKA and occurs most often in older adults with type 2 diabetes and infection. Fluid losses are more significant in HHS than in DKA due to a lack of early symptoms. Acidosis is rare because some circulating insulin is present. Treatment includes fluid and electrolyte replacement. Given the severe dehydration and higher rates of comorbidities in older adults with type 2 diabetes, mortality rates are higher in HHS than in DKA.

Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is a hyperglycemic condition occurring in 6% of pregnancies.[55] Placental hormones increase insulin resistance, especially as the pregnancy progresses, and postprandial hyperglycemia is the typical presentation. Risk factors include obesity, history of GDM, age older than 25 years, and family history of type 2 diabetes. Individuals with a history of GDM have an almost 10 times greater risk of developing type 2 diabetes.[56]

Cushing Syndrome

Cushing syndrome is a rare disorder resulting from chronic corticosteroid exposure leading to weight gain and hyperglycemia. The most common causes are exogenous corticosteroid therapy with prednisone and an ACTH-secreting pituitary adenoma. Other manifestations include adipose tissue accumulation in the face, posterior neck, and trunk, as well as muscle wasting, osteoporosis, and delayed wound healing.

CASE STUDY

Case Presentation

Marla is a 34-year-old woman who presents to establish primary care and manage her diabetes. She was diagnosed with type 2 diabetes 3 years ago and has a history of polycystic ovary syndrome and hypertension. She works as a pharmacy technician at a local pharmacy chain and has been married for 1 year. She lives with her husband and recently moved to the area from across the country for better job opportunities. Her A1C 1 year ago was at the recommended goal of 7.0%. Her current medications include metformin ER 2000 mg daily, enalapril 10 mg daily, and a prenatal vitamin daily. She has no allergies and does not smoke or drink alcohol. She has been checking her glucose level at home once daily, and readings vary from 110 to 165 mg/dL. She walks for 30 minutes, 2 days a week when she is off from work, as she feels she is on her feet enough when she is at work. She would also like a referral to obstetrics/gynecology, as she and her husband want to start a family in the coming year and are not using contraception.

Vital signs are as follows: weight, 72.5 kg; height, 160 cm; body mass index, 29.5; temperature, 36.9°C (98.4°F); pulse, 84 beats/min; respiratory rate, 20 breaths/min; and blood pressure, 140/82 mm Hg.

Lab results are as follows: A1C, 7.6%; glucose, 155 mg/dL; sodium, 135 mEq/L; blood urea nitrogen, 19 mg/dL; creatinine, 0.8 mg/dL; total cholesterol, 186 mg/dL; triglycerides, 186 mg/dL; HDL, 44 mg/dL; and LDL, 104 mg/dL.

Case Analysis Questions

1. What is your overall assessment of Marla's current diabetes management status?
2. What considerations should be made regarding Marla's desire to get pregnant?
3. How should Marla focus her self-management activities prior to becoming pregnant?

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CONCEPT
14

Nutrition

Sylvia Escott-Stump

Nutrition encompasses the process by which food and nutrients affect growth and development, cellular function and repair, health promotion, and disease prevention. As a science, nutrition delineates the requirements as well as the functions of macro- and micronutrients for optimal physiologic functioning. Most nutrients are needed daily to achieve short-term and long-term health goals. Nutritional status affects a variety of health conditions and disorders. In turn, many diseases adversely affect nutritional status by altering the ability to ingest, digest, absorb, and metabolize nutrients in their intact form or at the cellular level. Because nutrition and health are directly linked, this represents a fundamental concept for nursing practice.

DEFINITION

The concept of nutrition is complex, involving several physiologic processes. For this concept presentation, nutrition is defined as *the science of optimal cellular metabolism and its impact on health and disease.* Several other terms are essential to an understanding of this concept that merit definition. *Macronutrients* are the *kilocalorie (kcal)* energy-containing nutrients known as carbohydrates, proteins, and fats. Alcohol also provides kilocalories, but it is not considered a macronutrient because it cannot support or maintain bodily functions. Vitamins and minerals are *micronutrients* because they are required in minute amounts. Some minerals are needed in such small amounts that they are called "ultra" trace mineral requirements. Water is the final product considered to be an essential nutrient. *Phytochemical* refers to a plant compound that has antimicrobial, antioxidant, antiinflammatory, and immune-boosting properties. Examples of phytochemicals include lutein (associated with the green color of vegetables) and lycopene (found in high amounts in tomato products). Another popular phytochemical is resveratrol in red grapes and peanuts.

SCOPE

Nutritional status can be viewed as either *optimal* or *suboptimal.* An optimal nutritional status is one in which all nutrients are available in balanced amounts for cellular metabolism and physiologic function for the individual. A suboptimal (malnourished) state reflects either insufficient or excessive quantity or quality of macronutrients or micronutrients. The scope of this concept is represented as a continuum with malnutrition on both ends (insufficient nutrition and excess nutrition) and optimal nutrition in the middle (Fig. 14.1). The continuum representation is important because nutritional status has the potential to shift in either direction due to several factors and can be corrected with successful measures. Nutritional health status is also an issue of balance or imbalance. Poor nutritional status negatively affects health, and poor health can negatively affect nutritional status (Fig. 14.2).

NORMAL PHYSIOLOGICAL PROCESS

Oral Intake

Desirable intake requires ingestion of appropriate foods that meet macronutrient, micronutrient, and fluid needs for the individual. Macronutrient and micronutrient requirements are presented in Table 14.1. The amount of nutrients needed for optimal functioning changes throughout the life span. National guidelines for recommended intake, referred to as Dietary Reference Intakes (DRIs), are available on the U.S. Department of Agriculture website.

FIG. 14.1 Scope of Nutrition Concept.

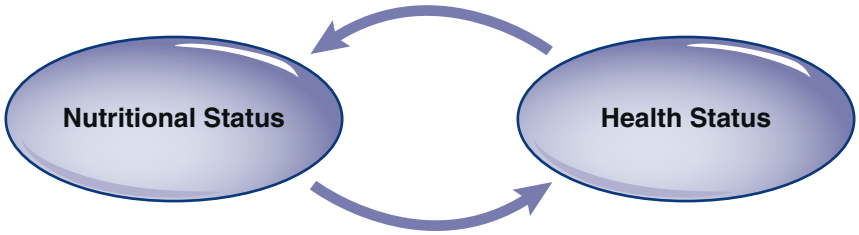

FIG. 14.2 Interrelationship Between Nutritional Status and Health Status.

TABLE 14.1 Required Nutrients

Macronutrients and Primary Role	Fat-Soluble Vitamins	Water-Soluble Vitamins	Major Minerals
Carbohydrates	Vitamin A	Vitamin C	Calcium
Primary source of fuel and energy	Vitamin D	B Vitamins	Phosphorus
Protein	Vitamin E	Thiamin	Magnesium
Facilitates growth and repair of tissues; energy source	Vitamin K	Riboflavin	Sodium
Fat		Niacin	Potassium
Source of fatty acid, necessary for growth and development; energy		Pyridoxine	Chloride
		Pantothenic	
		Biotin	
		Folate	
		Cobalamin	

Adequate oral intake of nutrients and water requires access to healthful food sources, informed choices, efficient chewing (mastication), and safe swallowing ability. Evidence shows that immunity begins in the intestine, so it is important to provide nutrients using the gastrointestinal (GI) tract whenever possible. A common philosophy is "If the gut works, use it."

Digestion

Digestion is the process of mechanical and chemical breakdown of food matter and complex macronutrients. Mechanical breakdown includes chewing in the mouth, as well as the mixing motions and muscular (peristaltic) action of propelling food through the stomach and intestines. Digestive enzymes are responsible for the chemical breakdown of food matter; this process is most efficient when food is thoroughly chewed, thus increasing the surface of food particles for enzyme action.

Chemical breakdown begins in the oral cavity. Saliva is a mucous-like fluid that contains the digestive enzyme amylase, which assists with food breakdown and aids the chewing and swallowing process. In the stomach, gastric enzymes begin to break down proteins into amino acids and carbohydrates into simple sugars. Pancreatic enzymes finalize digestion in the small bowel, with fats being broken down into smaller fatty acids. Bile, produced in the liver and stored in the gallbladder, is involved in fat digestion by modifying dietary fats into emulsions for better absorption.

Absorption

Once food matter has been digested, the microscopic hair-like projections (villi) that line the intestinal tract absorb nutrients into capillaries, which are then transported by the vascular system. The upper portion of the small intestinal tract (duodenum) is the primary site for absorbing trace minerals. The middle section (jejunum) is the primary site for absorbing water-soluble vitamins and proteins. The lower section (ileum) is the site of fat and fat-soluble vitamin absorption. Water is primarily absorbed in the colon.

Elimination

Large food particles and undigested fibers are not absorbed—they are eliminated through the colon. A healthy GI tract with efficient peristaltic action is required for optimal elimination. Bulky stools from adequate fiber intake stimulate colonic peristalsis. Elimination is enhanced with adequate fluid, fiber intake, and physical activity.

Cellular Metabolism

Cellular metabolism includes the hormonal and enzymatic processes within cell structures that allow proteins, carbohydrates, and fats (in digested form) to be used for energy or made into new products or tissues. Adequate intake of both macro- and micronutrients is required for optimal cellular metabolism. Proteins (in the form of essential amino acids) must be available for cells to manufacture other proteins, such as carrier proteins, and to enable tissue growth and repair. Adequate carbohydrate intake provides the energy for protein to do its many jobs. Carbohydrates are also required to provide glucose for the unique fuel needs of the brain, the neurologic system, and the red blood cells. Essential fatty acids maintain the integrity of phospholipid-based cell membranes that are found around every cell. Many metabolic enzymes assist in cellular metabolism. Zinc and magnesium are each part of more than 200 different metabolic enzymes. Both zinc and folic acid are critical in the production of proteins and cellular structures; without these micronutrients, growth and tissue repair are severely impaired.

Age-Related Differences

Although the general physiologic process of nutrition is consistent throughout life, there are specific age-related considerations worth noting.

Infants and Children

Significant changes in growth and development occur in the first year of life. Birth weight triples, and length increases by an average of 50%. Infants have very unique nutrient needs to support this rapid growth. Due to their lack of teeth, chewing capability, and immature GI tract, the nutritional intake of infants should be limited to breast milk (or formula) and water for the first 4 to 6 months of life. In addition, breast milk or formula

should continue until 12 months of age, when cow's milk may be introduced. Note as well that honey may contain *Clostridium botulinum* bacteria and should not be fed to infants under 1 year old. Other requirements for infants and children can be found by referring to lists of the age-specific DRIs.

Newborn infants depend on a strong suck–swallow reflex for adequate nutritional intake. As the child's GI tract develops, solid foods that do not require chewing can be gradually introduced at 6 months of age. When teeth emerge, the older infant and young child can be offered foods with various textures. The small oropharynx places young children at risk of choking; the need to provide foods in very small bites is particularly important, and certain foods should be avoided altogether (such as whole grapes, hot dogs, and popcorn.)

Pregnancy and Lactation

Significant changes in nutrition needs occur during pregnancy and lactation to account for the body composition changes during pregnancy (hormonal, metabolic, and anatomic), growing fetus before birth, and the production of breast milk after delivery. Increases in carbohydrates, proteins, fats, and most micronutrients are recommended. Expected weight gain during pregnancy ranges from 15 to 40 pounds, depending on prepregnancy weight and stature. Specific nutrient requirements during pregnancy and lactation can be found by referring to the DRIs.

Older Adults

Physiologically, the effects of aging may be associated with a reduced ability to ingest, absorb, and metabolize nutrients. In the mouth, reduced chewing ability, less saliva production, and altered sense of taste are common concerns. The esophagus may be elongated (due to kyphosis), and atrophic changes may occur, particularly in the lower esophagus. Atrophic changes and intestinal microflora occur in aging, resulting in reduced efficiency in absorption. In the absence of disease, the liver, gallbladder, and pancreas continue to function, although there is a decrease in metabolic efficiency.

VARIATIONS AND CONTEXT

Malnutrition is a comprehensive term that refers to two major categories of abnormal conditions: insufficient nutrition and excess nutrition. Within each of these two categories, nutritional problems are represented by the specific nutrient or nutrients involved. The causes of problems vary widely and include problems with access, intake, absorption, and metabolism.

Insufficient Nutrition

Insufficient nutrition occurs when there is inadequate intake, impaired nutrient absorption, or ineffective nutrient utilization, leading to a state of malnutrition. Malnutrition can be associated with insufficient calorie intake leading to weight loss and/or insufficient intake of one or more nutrients, yielding nutritional deficiencies. The state of being underweight is described as a body mass index (BMI) less than 18.5. *Starvation-related malnutrition* describes conditions such as anorexia nervosa, whereas *acute disease-related malnutrition* may occur after extensive cancer treatments, burn injury, or trauma. The third type of adult malnutrition (*chronic disease-related malnutrition*) is exemplified by sarcopenic obesity or pancreatic cancer.

Excess Nutrition

At the opposite end of the spectrum is the situation in which excessive nutritional intake leads to weight gain or nutritional toxicities. The most common form of excess nutrition is associated with excessive calorie intake leading to weight gain. Standardized categories, based on BMI, are used to describe overweight and obesity. For adults, overweight is described as a BMI between 25.0 and 29.9. Three classes of obesity are categorized as class I (BMI of 30 to 34.9), class II (BMI of 35 to 39.9), and class III (BMI >40). Child obesity is defined in terms of BMI compared with percentiles on standardized growth charts. A child whose BMI is between the 85th and 95th percentile for children of the same age and sex is classified as overweight; obesity is defined as *a BMI greater than the 95th percentile*.

Excess micronutrient intake most often occurs with the use of high-dose fat-soluble vitamin and mineral supplements or when consuming foods that have 100% of the DRI levels of a nutrient, plus an oral supplement, and a nutritionally fortified beverage all in the same day. The outcomes of excessive food or supplement intake on physiologic processes can be detrimental, especially if prolonged over time.

CONSEQUENCES

A poor quality of diet, when consumed over a prolonged period, contributes to physiologic consequences as shown in Fig. 14.3. Altered health can occur on both ends of the spectrum from either nutritional deficiencies or excess. These are best understood by considering the specific nutrients involved. Chronically inadequate intake is devastating for infants and children because it limits their growth, brain development, ability to learn, and, later, their ability to participate effectively in society.

Nutritional Deficiencies

Macronutrient Deficiencies

Because protein is a component of every cell of the body, deficiency can have consequences that are either subtle or dramatic, depending on the severity and length of time. In addition, inflammation from acute or chronic disorders readily depletes protein from lean body mass and other tissues. At any age, inadequate protein intake adversely impacts the body's ability to repair or replace body tissues or produce other constituents such as immune factors. In older adults, the loss of muscle mass (sarcopenia) may be difficult to replace. A spiraling decline in health may occur if not corrected through rapid and effective interventions. Insufficient circulating protein in the blood (hypoalbuminemia) can also lead to anasarca (severe generalized edema).

In children, an inadequate intake of protein and kilocalories impairs growth and development by stunting height and brain development. Insufficiency of protein alone, with adequate energy, is a problem if an infant is weaned to a diet that contains

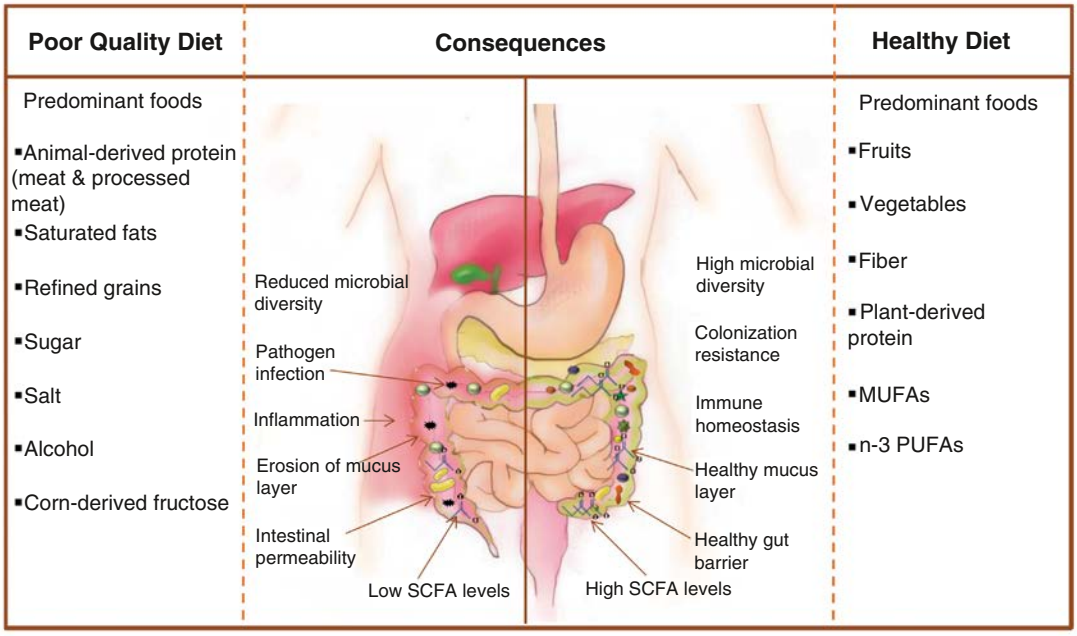

FIG. 14.3 Consequences of a Poor-Quality Diet Versus a Healthy Diet. MUFAs = monounsaturated fatty acids; PUFAs = polyunsaturated fatty acids. (From: Mills S, Stanton C, Lane JA, et al. Precision Nutrition and the Microbiome, Part I: Current State of the Science (2019). *Nutrients, 11*(4), 923.)

mostly grains. Pediatric indicators of malnutrition include z-scores for weight-for-height/length, body mass index-for-age, or length/height-for-age or midupper arm circumference. Indicators may also include slow weight gain velocity (<2 years of age), weight loss (2–20 years of age), deceleration in weight for length/height z-score, and inadequate nutrient intake.

Inadequate carbohydrate intake can alter cellular metabolism and results in the use of dietary protein as a fuel substrate, diminishing the capacity for cell growth and repair. Ultimately, when inadequate carbohydrate intake continues, there is a shift to the use of body fat and protein for energy resulting in weight loss and accumulation of ketones, especially if insulin is unavailable.

Essential fatty acid deficiency affects all cellular membranes and is particularly a problem with premature infants. Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are long-chain omega-3 fatty acids that support retinal development, neurotransmitter production, and brain function.

Vitamin and Mineral Deficiencies

Deficiency of vitamin C was one of the first recognized nutrient deficiency diseases, with the severe form (scurvy) being a cause of death among early sea voyagers. British sailors were called "limeys" because their intake of limes while onboard sea vessels prevented this condition. In the early 20th century, processed grains were becoming popular. Soon, a mysterious syndrome appeared as the "4 Ds": dermatitis on sun-exposed areas, diarrhea, dementia, and death. This condition (pellagra) was determined to be from a B vitamin deficiency. The government mandated that processed white flour products had to be enriched with the nutrients that were removed during processing—vitamins B_1, B_2, and B_3 (thiamin, riboflavin, and niacin, respectively).

The role of folic acid in the development of the central nervous system had been known for decades, but not until the 1990s did it become clear that most neural tube defects (NTDs) could be prevented by fortifying grains. Folic acid is now added to flour processed in the United States and in many countries; an important reduction in NTDs has been shown as a result.

Lutein and zeaxanthin are carotenoids found in yellow and orange foods (cantaloupe, corn, carrots, salmon, and egg yolks) that help prevent macular degeneration. The intact form of vitamin A is also essential for vision; deficiency begins with loss of night vision and progresses to total blindness.

Vitamin D insufficiency is known to lead to osteoporosis, hip fracture, and hyperparathyroidism. Studies also suggest links with cardiovascular disease, cancer, multiple sclerosis, tuberculosis, and muscular and immune system disorders. Table 14.2 summarizes key nutrient deficiency and toxicity concerns.

Nutritional Excess

Malnutrition also occurs from excess macronutrient (energy) intake that leads to weight gain. Often, obese individuals have micronutrient insufficiency while consuming excess calories from the macronutrients.

The consequences of excessive weight have been well documented and can include type 2 diabetes, coronary heart disease, hypertension, stroke, fatty liver disease, gallbladder disorders, sleep apnea, asthma and other respiratory problems, musculoskeletal disorders, as well as hormonal cancers (breast, prostate). With more obesity among children and teens, these medical conditions are now seen at younger ages, with similar health challenges and high risks for early morbidity and mortality.

RISK FACTORS

All individuals have the potential risk of becoming malnourished. While certain risk factors are more common in population groups or during certain life stages, individual choices and circumstances also play a role.

TABLE 14.2 Common Vitamin and Mineral Deficiencies and Toxicities

Nutrient	Consequences of Deficiencies	Consequences of Toxicities
Vitamin A	Night blindness	Loss of appetite, bone pain, hypercalcemia
Vitamin B_1 (thiamine)	Wernicke encephalopathy with neurodegeneration	Toxicity rare
Vitamin B_3	Pellagra with 4 Ds: dermatitis, diarrhea, dementia, death	Abnormal glucose metabolism, flushing, nausea and vomiting
Vitamin B_{12}	Pernicious anemia, psychiatric disorders	Toxicity unknown
Biotin	Hair loss	Toxicity unknown
Vitamin C	Bleeding tendency, scurvy	Inhibits zinc absorption, urinary stones
Vitamin D	Rickets, bone disease, muscle pain, falls	Hypercalcemia, renal stones, calcification of soft tissues
Copper	Anemia, skin lesions, neurologic disease, bone fragility	Found in Wilson disease; neuron and liver cell damage
Iron	Anemia, fatigue, poor growth	Hemochromatosis (genetic) with liver, pancreatic, and cardiac damage
Magnesium	Hypertension, dysrhythmia, preeclampsia	Increased calcium excretion
Zinc	Dermatitis, impaired taste, impaired growth, low level of alkaline phosphatase enzyme	Copper deficiency, renal damage, nausea and vomiting, diarrhea

Populations at Risk

Age or Life Stage

At the beginning of life and again at the later stages, nutritional deficits are a significant concern. Pregnancy is a very important stage because of the long-term effects on the health of both infant and mother. The very young are at risk because of immature organ development and total dependence on others for feeding. Particularly at risk are premature infants because of their developmental stages and impaired oral intake. With parenteral or tube feeding, the use of breast milk may be impossible, eliminating the benefits of cost savings, immunologic protection, ideal nutrient content, and microbial support.[1,2]

Senior citizens are also at high risk for nutritional inadequacies. Factors such as reduced organ function, limited income, interactions between nutrients and medications, isolation, decreased interest in meal preparation, changes in appetite, fatigue, and altered taste sensations are common. Those elderly who are institutionalized are at even greater risk. Severe dietary restrictions, rigid mealtimes, generally poor health status, and feeding dependency can lead to inadequate oral intake. Physiologic risk factors include frailty, BMI <21, and neurologic deficits from a stroke or Alzheimer's disease.[3–5]

Ethnic Groups

Nutritional deficits have triggered many nutritionally-related chronic diseases of the modern world.[6] Vitamin D deficiency is more frequently found among Hispanics and Americans of African heritage than those of European heritage.[7,8] Type 2 diabetes also seems to affect Hispanic, Native American, and African Americans in higher percentages than Europeans. Diseases more common in European heritage include cystic fibrosis (CF) and hemochromatosis, and Tay-Sachs disease is more often found in the Ashkenazi Jewish populations.[9]

The Poor and Underserved

As a population group, those of low socioeconomic status are at risk for malnutrition because of food insecurity and food availability. Lack of access to healthy foods because of insufficient funds, distance to supermarkets, limited options for food preparation, high prices of quality foods, cheap prices of fast food, and limited transportation are some of the reasons why individuals with low incomes may eat poorly and become obese.[10] Where access to healthy, affordable food is limited, the community is designated as a "food desert." Creative approaches to food budgeting and referrals to local resources are often needed. Individuals who are homeless, mentally ill, or disabled are at risk for nutritional deficiencies when they experience food insecurity.

Individual Risk Factors

Genetics

Many conditions that affect nutrition are linked to genetics. Inherited metabolic defects include phenylketonuria (PKU), a deficiency in the enzyme responsible for the metabolism of the amino acid phenylalanine. PKU allows phenylalanine to accumulate in the brain, blood, and tissues, leading to cognitive dysfunction unless the affected individual follows a low-phenylalanine diet for life. Other rare inherited metabolic defects include galactosemia and maple syrup urine disease. In CF, thick secretions block pancreatic ducts, eventually leading to impaired digestion and absorption of fats and fat-soluble vitamins.

Lifestyle and Patterns of Eating

How one chooses foods, shops, plans, and prepares meals ultimately affects his or her nutritional status. Factors that influence these decisions include interpersonal relationships, learned stress-coping mechanisms, and alterations in mood. Weight gain can occur when food habits change to match those of the partner, such as during dating and marriage.

Family food offerings can positively or negatively influence nutritional intake. Mothers who avoid high-fat, high-sugar foods but emphasize a variety of vegetables, fruits, whole grains, lean meats, and low-fat milk can send the right message to their children. Family influences that may negatively affect nutritional status include lack of home-prepared meals, eating meals on the go, restricting multiple food groups because of allergies or dislikes, or limited choices because of financial challenges.

The influence of peers is common among adolescents. Skipping meals, following fad diets, choosing salty and sugary snacks over healthy foods, eating supersized portions, and drinking alcohol are examples. Here, mood swings are common. Coping mechanisms often include eating large amounts of sweets or comfort foods, or reducing intake altogether during periods of depression. Peer influences are especially strong among young people with lower self-esteem.[11]

Personal Food Choices

Taste, palatability, habits, hunger, satiety, and psychological factors such as mood, stress, or guilt all affect personal food choices. Children respond to foods that are offered and may overeat if portions are excessive. Later in life, men and women tend to change some eating behaviors when they become first-time parents.[12] Family-based approaches that offer food education, health consciousness, self-efficacy, and other life skills can be quite effective at this time.

Occasionally, individuals may experience nutritional disorders because of erroneous knowledge or perceptions about foods. Some fad diets require the omission or limitation of whole food groups; others allow only certain foods (e.g., the grapefruit diet, the cabbage soup diet). The person who follows such restrictions may unknowingly miss out on important nutrients.

If a vegan diet is undertaken without adequate knowledge, the intake may be insufficient for essential amino acids, calcium, zinc, and vitamins D and B_{12}. Inadequate vitamin B_{12} has been associated with anemia and neurologic damage, especially detrimental in children.[13] Calcium and vitamin D intakes tend to be low unless fortified foods or supplements are consumed. Without intake of foods containing the essential amino acids, protein deficiency can occur. Fortunately, a carefully planned vegan diet offers protection against obesity, hypertension, type 2 diabetes, and cardiovascular disease in adults, especially men.[14]

Underlying Medical Conditions

A wide range of medical conditions place individuals at risk for various nutritional problems. Some of these are shown in Table 14.3.

Impaired oral intake. Adequacy of oral intake is associated with the ability to chew and swallow. Thus, the inability to chew or swallow properly can easily lead to malnutrition. Pain from dental caries, poorly fitting dentures, and loss of teeth can impair the ability to chew and limit diet quality. Cleft palate affects an infant's sucking ability, thereby limiting successful breast-feeding. Difficulty swallowing (dysphagia) is common in neurologic conditions, especially after a stroke. Not all patients require altered food consistency, but patients should be seated as upright as possible to prevent aspiration. In conditions such as Parkinson's or Alzheimer's disease, the sense of smell diminishes, leading to decreased food intake. Altered senses of taste and smell have been noted in COVID-19 patients, often for prolonged periods of time; monitoring for signs of malnutrition should occur. Finally, unbalanced food intake may also occur in cases of anorexia nervosa, mood disorders, autism, anxiety, schizophrenia, and depression.

Impaired digestion and absorption. Many conditions interfere with digestion or absorption and place the affected individual at risk for malnutrition. Examples of such conditions include lactose intolerance, gastroparesis, gastric surgery, intestinal resection, and inadequate gastric acidity. Some genetic conditions lead to defects in metabolism of nutrients, such as PKU (as described previously) or CF. Impaired digestion and absorption can also occur as an adverse effect from some medications.

TABLE 14.3 Impact of Medical Conditions on Risk for Malnutrition

Medical Conditions or States	Impact on Nutritional Status
Oral/GI problems with limited protein–calorie intake (e.g., sensory issues, allergies, dental problems, dysphagia) Impaired intestinal absorption of proteins (diarrhea/malabsorption: e.g., celiac disease, Crohn disease, short-bowel syndrome, bariatric surgery) Hepatic disease with impaired protein synthesis Chronic kidney disease with proteinuria Nephrotic syndrome Cancer with increased metabolic needs	Hypoalbuminemia/impaired protein nutrition
Burns with loss of protein in body fluids Hypoalbuminemia (lack of carrier proteins) Hyperphosphatemia (in chronic kidney disease, end stage) Malabsorption/diarrhea Hypoparathyroidism Hypomagnesemia Vitamin D deficiency	Hypocalcemia
Hyperparathyroidism Hyperthyroidism Adrenal insufficiency Cancer Hypervitaminosis A and D	Hypercalcemia
Wound healing protocol with excess supplementation of zinc	Copper deficiency anemia
GI bleed	Iron deficiency anemia/microcytic anemia
Hemochromatosis Hepatic disease	Iron overload
Gastrectomy Pernicious anemia/lack of intrinsic factor Primary hypothyroidism Achlorhydria	Vitamin B_{12} deficiency
Epilepsy with use of antiseizure medications Chronic kidney disease (end stage) and dialysis treatments	Folic acid deficiency/megaloblastic anemia
Edema/hypertension with K^+-depleting diuretics Malabsorption/diarrhea Hepatic disease Pancreatitis	Hypomagnesemia
Chronic kidney disease with limited ability to convert to active form Malabsorption	Vitamin D deficiency
Hypoalbuminemia Chronic kidney disease (end stage) and dialysis treatments Alcoholic cirrhosis/hepatic disease Inflammatory bowel disease Sickle cell anemia	Zinc deficiency

GI, Gastrointestinal.

Increased metabolic demand. A variety of conditions increase metabolic rate and energy needs, thus increasing the risk for malnutrition. Examples include cancer, chronic obstructive pulmonary disease, Parkinson's disease, trauma, burns, stroke, and HIV/AIDS. Depending on the severity of the disease state, it may be difficult to meet the increased nutrient needs without enteral or parenteral nutrition support.

Altered organ function. The failure of organs involved in digestion and metabolism are associated with nutritional deficiencies. Hepatic disease adversely affects the ability to reassemble amino acids into the various proteins needed for physiologic function. A damaged liver will also be unable to metabolize and excrete drugs properly, thus altering nutrient absorption and utilization even further. In chronic kidney disease (CKD), nutritional status is adversely affected through a variety of mechanisms. Protein is lost through the urine and can lead to impaired skin integrity, slow wound healing, suppressed immunity, sarcopenia, and altered osmotic pressure. As CKD progresses, phosphorous levels can increase and lead to hypocalcemia. Renal disease further reduces nutrient levels, especially vitamin D, because the kidney metabolizes vitamin D_2 into the bioactive D_3 form. With lowered vitamin D status, bone health is impacted because vitamin D is required to absorb calcium.

The kidneys are involved in producing red blood cells; therefore, in patients with CKD, an anemia can develop that is unresponsive to iron intake due to an insufficient level of erythropoietin, a protein-based hormone. Even nutrition therapy can have adverse consequences; limited fluid or food intake and phosphorus/protein/potassium restrictions can prevent nutritional adequacy. This is especially true when CKD is compounded by an acute illness. Because organ damage and illnesses can seriously affect nutritional status, Table 14.3 is useful as a review.

ASSESSMENT

All nurses should know how to perform a basic assessment of nutritional status. Maintaining an awareness of the risk factors helps to focus the interview and examination.

History

In the interview of the patient or family members, it should be remembered that food has a strong emotional component. Actual food practices or eating behaviors may not be revealed unless there is a level of trust and rapport. This is especially true when interviewing parents of a child whose growth and development are not within expected ranges. In general, adults respond more openly to health providers if they are aware of the rationale for the questions. Mentioning some potential nutritional complications of a condition, or asking about the individual's personal health concerns, allows for focused interviewing.

The basic elements of this history include nutritional intake, diet modifications, changes in appetite and intake, changes in weight, medical history, current medical conditions, current medications and treatments, allergies, family history, and social history. In addition, it is important to consider the chief complaint/presenting symptoms because they might relate to nutrition and may warrant closer analysis. The most important screening problems or presenting symptoms include the following: unplanned changes in weight, changes in appetite or intake, nausea and/or vomiting, difficulty chewing or swallowing, abdominal pain or discomfort, changes in bowel habits, and recent history of prolonged constipation or diarrhea.

Examination Findings

Several techniques are used to assess nutritional status, including general observation, anthropometric measurements, and other various clinical findings from systems' assessment. Measuring actual height and weight and determining BMI are the initial steps in assessing nutritional status. General goals and interpretation guidelines for BMI are presented in Table 14.4. If BMI is within normal limits and weight has been stable, it is still important to have at least a brief assessment of oral intake to verify that macronutrients and micronutrients are being consumed in appropriate amounts. If there is any suspicion of poor nutritional status, lab work should be ordered by the attending provider to help assess status more completely.

TABLE 14.4 Interpreting Body Mass Index in Children and Adults

Age Group and Approach	BMI	Interpretation
Children (Percentile)	<5th	Underweight; may be acceptable if bone growth is adequate and child "follows the curve"; promote increased kilocalorie intake as needed if weight curve is declining.
BMI percentile for children: Apply calculated BMI (weight in pounds/height in inches/height in inches × 703) to percentile growth chart (see http://www.cdc.gov/growthcharts)	5th to 85th	Optimal weight; still important to "follow the curve" and meet goals for bone growth.
	85th to 95th	Overweight; goal to prevent obesity without causing risk to bone growth or emotional development.
	≥95th	Childhood obesity; goal for young children is not to exceed percentile growth curve; promote physical activity and healthy eating to help "grow into weight."
Adults (Calculated BMI)	<19	Underweight; severe level <15 indicative of anorexia.
BMI calculated by weight in pounds/height in inches/height in inches × 703	19–24.9	Optimal body weight composition; elderly persons should strive for BMI >21.
	25–29.9	Overweight; may be appropriate given health status.
	30–34.9	Class I obesity; slow weight loss advised to promote permanent weight loss; not appropriate for older populations to lose weight.[21–22]
	35–39.9	Class II obesity; slow weight loss advised; may be a candidate for bariatric surgery if comorbidities present and not able to achieve long-term weight loss through diet and exercise.
	≥40	Class III or "extreme" obesity (formerly known as morbid obesity); may be a candidate for bariatric surgery based on health status, age, and level of obesity and history of not being able to achieve long-term weight loss through diet and exercise.

BMI, Body mass index.

General physical appearance, level of orientation, and demeanor will give insight into health and nutritional status. Assess skin integrity and turgor. The skin should be smooth and elastic without cracks or bruising. The hair should be shiny and not brittle. Nail beds should be smooth, pink, and firm. The teeth should be free of cavities, and oral tissues should be moist, pink, and firm. Mucous membranes around the eyes should be pink, moist, and free of lesions; the sclera should be white. The cornea should be clear and shiny.

Diagnostic Tests

Nurses need to understand common nutrition-related tests, and they need to know when to alert the physician or dietitian if malnutrition is suspected.

Laboratory Tests

Serum albumin, prealbumin, and C-reactive protein. Serum albumin measures circulating protein in the blood. While low albumin may indicate poor protein intake, other conditions (chronic or acute inflammation, blood loss, altered fluid status) may also decrease serum albumin levels. Careful judgment is needed. Elevated high-sensitive C-reactive protein (hsCRP) is often useful for identifying inflammation in conjunction with low serum albumin.

Very low albumin levels indicate severity of illness and are also predictors of mortality in hospitalized adults.[15] Prealbumin (transthyretin) reflects recent dietary protein intake. Thus, low prealbumin is more closely related to nutritional status than albumin is.

Blood glucose and hemoglobin A_{1c}. Blood glucose reflects metabolism of carbohydrates, and this test is generally used to screen or monitor impaired glucose metabolism. Hypoglycemia may suggest inadequate caloric intake and hyperglycemia may be an indication of diabetes mellitus or an acute illness. Hemoglobin A_{1c} is a test that shows average blood glucose levels over time and is used in the management of diabetic patients. It indicates how well glucose levels are controlled. Note that for anemia of renal disease, false readings of the A_{1c} level may occur; finger-stick glucose tests may be more reliable in these situations.

Lipid profile. A lipid profile includes several tests that assess lipid metabolism. Tests included are low-density lipoprotein (LDL), high-density lipoprotein (HDL), cholesterol, and triglycerides. High triglyceride levels generally reflect hyperinsulinemia, although an individual with newly diagnosed type 1 diabetes may have temporary elevations.

Electrolytes. Electrolytes provide information about general health status and specific information about sodium, potassium, calcium, magnesium, and phosphorus. These are usually ordered as part of a chemistry profile blood test. Electrolytes can become imbalanced with inadequate dietary intake or many other conditions, such as renal disease, liver disease, and diabetes. See the Fluid and Electrolytes concept for further information.

Hemoglobin and hematocrit. Hemoglobin (Hgb) and hematocrit (Hct) is a blood test that examines red blood cells (including the number, size, shape, and color) to diagnose anemia caused by dietary deficiency, such as iron, folate, and vitamin B_{12}. Hgb and Hct also provide information about the hydration status of the patient.

CORE COMPETENCIES

Nutrition

- Integrate evidence-based knowledge from nursing and other sciences as it relates to nutrition.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to nutrition.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to nutrition for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to nutrition.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to nutrition.
- Demonstrate clinical judgment founded on broad knowledge of nutrition.

CLINICAL MANAGEMENT

Clinical management associated with the concept of nutrition involves the prevention of illness, early detection, and appropriate interventions to manage nutrition-related conditions. Core competencies to support nutritional wellbeing and management of individuals with nutritional conditions is presented in the Competency Box.

Primary Prevention

Primary prevention measures are aimed at disease risk reduction and behavior modification. The foundation of primary prevention efforts, as related to this concept, includes healthy eating and physical activity.

Healthy Eating

A person who follows the current *Dietary Guidelines for Americans* and MyPlate (see ChooseMyPlate.gov) can achieve a healthy diet. The inclusion of the minimum number of servings in MyPlate will meet the DRI micronutrient and macronutrient needs for general health needs. The *Dietary Guidelines* are aimed more at preventing chronic health diseases associated with excess intake of macronutrients, especially solid fats (saturated/trans fats), sugar, and salt. Reading the DRI values on food labels reinforces implementation of the Dietary Guidelines. Food labels include four marker nutrients: calcium, iron, vitamin A, and vitamin C. In general, if these micronutrients are included in adequate amounts from foods naturally high in them, the other key micronutrients will also be obtained.

Breast milk contains all the essential nutrients needed by infants. In addition, it has immunologic benefits that protect against acute and chronic disease, a natural form of "vaccine." Exclusive breast-feeding is optimal for the first 4 to 6 months

of life, followed by carefully planned complementary foods. In many instances, healthy table foods in proper amounts and consistency are acceptable and prevent the need for expensive baby foods.

Physical Activity

Physical activity helps to prevent obesity. The goal for adults includes 30 minutes of physical activity on most days of the week, about 150 or more minutes weekly. Weight loss may require at least twice this amount of exercise. A good suggestion is step counting; 10,000 steps equals nearly 5 miles, burning 400 to 500 calories. Note that guidelines for exercise need to be individualized. A sedentary person or one who has sarcopenia, pulmonary, or cardiovascular disease may require shorter intervals of exercise more frequently.

Secondary Prevention (Screening)

Secondary prevention involves screening tests to detect disease. Screening for nutritional status in the general population is limited primarily to lipid screening, blood glucose screening, and BMI. Blood glucose screening is advised for persons with evidence of insulin resistance, such as central obesity found with metabolic syndrome. Lipid screening is recommended for those with specific cardiac risk factors. Although not an essential nutrient, coenzyme Q10 may be required with long-term statin use.

For infants, routine screening that occurs at birth includes the following: glucose levels; at least 40 different genetically linked metabolic disorders, including PKU and maple syrup urine disease; carbohydrate disorders, including galactosemia; other congenital disorders that can affect nutritional status, including cystic fibrosis; and HIV. The number of screenings will vary from state to state.

Screenings for teenagers and young adults include a review for obesity, eating disorders, and dyslipidemia. Older adults are generally screened for high cholesterol, abnormal blood glucose levels, obesity, and osteoporosis.

Collaborative Interventions

There are several interventions for nurses to manage individuals who have nutrition-related health conditions. Interventions are classified into the following groups: dietary interventions, pharmacologic agents, and surgical interventions. Coordination of care often involves working with the registered dietitian-nutritionist (RDN), home care services, or a community agency (e.g., referral to Meals-On-Wheels for home-delivered meal services). Discharge planning is an essential team effort on behalf of the patient.

Dietary Interventions

As part of the healthcare team, nurses often work with other health professionals for optimal nutritional outcomes. *Registered dietitian-nutritionists* are health professionals who have a background in physiology, food science, biochemistry, and metabolism, with knowledge about the macronutrient and micronutrient contents of foods and how the body uses them. Another health professional, the *dietetic technician,* assists the RDN with menu planning, nutrition education, and management of food services. "Nutrition therapy" is a term used to describe the typical services of the RDN or registered dietetic technician, whereas "medical nutrition therapy (MNT)" is a legal term for reimbursable services provided by the RDN.

The formal nutrition care process includes documentation with standardized language and codes established for the dietetics profession. Complex assessments, nutrition diagnosing, and diet therapy interventions are the role of the RDN. A qualified RDN may have diet order-writing privileges as determined by competency assessment, licensure laws, and facility protocols. That RDN can adjust a patient's meal plan so that it is appropriate for health goals and realistic, economical, and feasible for the family. Nurses should understand basic modified diets to reinforce messages provided by the RDN and encourage referrals as needed.

The concept of *personalized nutrition* has replaced the old paradigm that "one diet fits all" through the science of nutrigenomics—in other words, how genetics will influence nutritional interventions. Individuals differ in how nutrients are assimilated, metabolized, stored, and excreted; these differences are often significant. Further, individualized plans are needed to address unique dietary needs of patients based on their age, calorie needs, and underlying health condition. For example, not all hypertensive individuals respond to sodium (salt) restriction,

CLINICAL NURSING SKILLS RELATED TO NUTRITION

Assessment
- Physical signs of malnutrition
- Weight and height records—accuracy, frequency; scale calibrations

Education
- Basic nutrition and guidance on modified diets

Feeding-dependent patient assistance
- Dysphagia management
- Hydration, intake–output records
- Nursing assistant training

Nutrition support
- Enteral nutrition: Tube feedings
  - Nasogastric tube
  - Gastrostomy tube
  - Jejunostomy tube
- Parenteral nutrition

Between-meal nourishment administration
- Documentation

Red flags: Referral to the registered dietitian–nutritionist
- Pressure ulcers
- Weight loss
- Inadequate oral intake or changes in appetite
- NPO, nausea or vomiting >3 days

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not all individuals with high serum cholesterol levels respond to a low saturated fat diet, and sugar alone is not the culprit in diabetes management.

Another dietary intervention ensures that the food provided matches the patient's ability to eat. The patient can chew all kinds of foods if he or she has intact original teeth, good oral hygiene, or well-fitting dentures plus adequate saliva. Unfortunately, many hospitalized or aging patients require assistance with meals because they have missing teeth or ill-fitting dentures. Nurses can make note of these concerns early in treatment so that diet orders may be adjusted or oral health services can be provided.

Enteral Nutrition

Tube feedings are indicated for an individual who is unable to eat or swallow but has an intact/functional GI tract. Feeding tubes are inserted directly into the stomach (gastrostomy) or small intestine (jejunostomy) for the delivery of enteral feedings. A specific formula is selected by the physician and RDN based on patient needs. Nurses administer tube feedings either by gravity or through a feeding pump. In some hospitals, the RDN may be qualified to write the diet orders or to insert the tube; annual competency assessment is important.

Placement of a percutaneous endoscopic gastrostomy (PEG) feeding tube requires a small surgical incision into the stomach. Fortunately, the procedure is relatively safe, simple, and reversible. Although unused formula must be discarded after 24 hours, the tubes can be maintained longer with strict infection control procedures according to facility protocols.

Parenteral Nutrition

Parenteral nutrition is used to provide either total or supplemental nutrition support intravenously. These intravenous feedings are generally used for patients who have intestinal failure and cannot be fed orally or by enteral feeding. Here, nutrition consists of a glucose-based intravenous solution (various dextrose concentrations) with electrolytes, minerals, and amino acids. Fat emulsions (lipids) may also be included or administered as a separate solution.

Because parenteral nutrition is indicated for individuals who are unable to process nutrients via the GI tract for more than 4 or 5 days, therapy can be short term or long term. For short term, it may be administered peripherally, whereas for long term, it can be administered centrally. Because sepsis and electrolyte and metabolic imbalances can occur, meticulous nursing care of the vascular access is required. It is also essential to teach patients and caregivers about antiseptic procedures if home parenteral nutrition (HPN) is needed.

Excessive infusion of enteral or parenteral nutrition solutions can be dangerous. The critically ill patient is vulnerable because metabolic shifts occur throughout each day from sepsis and various procedures. Ideally, indirect calorimetry is used to determine energy needs so overfeeding can be avoided. Extra caution is required in the intensive care, pediatric, and neonatal units.

Surgical Interventions

One surgical intervention affecting nutritional status is bariatric surgery. It is increasingly being used to control obesity and diabetes. In general, bariatric surgery has demonstrated good success for weight loss, improved glucose level, and normalized blood pressure. However, complications include macro- and micronutrient deficiencies that are not easily managed, either because of lack of adherence to dietary and supplement guidelines or because of limited knowledge of actual needs.[16] In addition, weight gain can occur if the patient is noncompliant with calorie control.

The most malabsorptive bariatric surgical procedure is the Roux-en-Y gastric bypass. In this procedure, most of the stomach and the proximal small intestine are bypassed, with food entering a Y-shaped reconnection between the upper stomach and the distal portion of the duodenum or jejunum. Gastric band procedures are much less invasive, although nutritional deficits are still possible.

Pharmacologic Agents

Oral supplements are available to enhance the nutritional status of individuals, and most are available over the counter (OTC). Supplement examples include vitamin supplements (e.g., multivitamins, niacin, B-complex vitamins, and vitamin C), mineral supplements (e.g., iron and calcium folic acid), and protein and nutrient supplements (Ensure, nutrition bars, enhanced puddings, even coffees). Unfortunately, many patients use these products indiscriminately and may put themselves at risk for drug-nutrient interactions. It is wise for nurses to ask about prior or current use of any OTC products, especially among vulnerable children and older adults.

For the use of pharmacologic agents in obesity management, research continues. There have been complications with previous forms of weight loss medications, and currently these medications have limitations on duration of use. Statins (e.g., atorvastatin, fluvastatin, lovastatin, pravastatin, and rosuvastatin) are the drugs of choice for treatment of lipid and cholesterol reduction because of their ability to inhibit the synthesis of cholesterol, leading to reductions in LDL and HDL.

There are a variety of pharmacologic agents that address other nutrient-based problems, including agents to control glucose levels (see Concept 13, Glucose Regulation). Herbal remedies may be used by patients who have osteoarthritis, pain, or other chronic conditions; these products are not regulated and should be closely monitored for undesirable side effects.

INTERRELATED CONCEPTS

Nutrition is interrelated with nearly all the health and illness concepts as a preventive or disease management intervention. In addition, nutrition has an interrelated role with many body functions, as presented in Fig. 14.4. **Glucose Regulation** (closely linked to **Hormonal Regulation**) is dependent on total caloric intake and is critical for adequate metabolism of nutrients; glucose regulation is much like a subconcept of nutrition. Nutrition

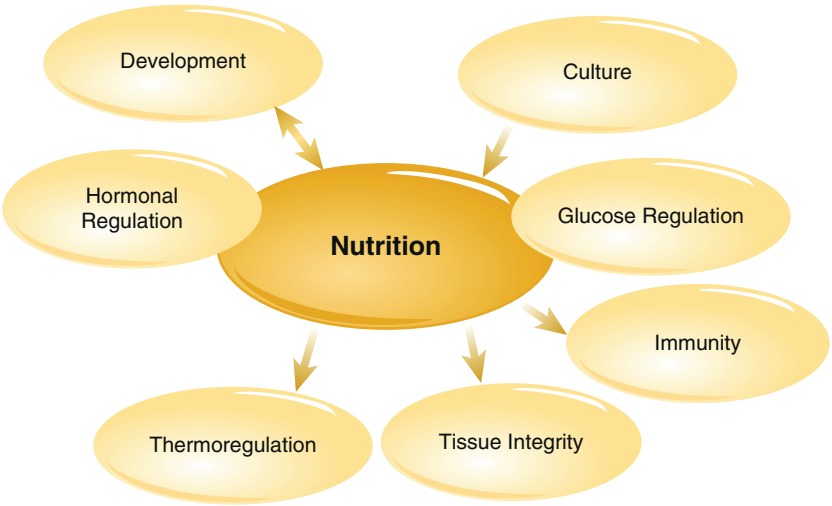

FIG. 14.4 Nutrition and Interrelated Concepts.

influences other metabolic processes, such as **Immunity**, **Tissue Integrity**, and **Thermoregulation**; these all depend on adequate nutrients for optimal functioning. **Development** and **Culture** are also interrelated based on the influence of these concepts on dietary patterns, religious observances, rituals, and preferences.

CLINICAL EXEMPLARS

Clinical exemplars of nutrition represent conditions associated with insufficient nutrition and excessive nutrition. Although it is beyond the scope of this concept to list all possible conditions that have a link to nutrition, Box 14.1 presents common exemplars seen in clinical practice. A brief discussion of a few common clinical exemplars follows. For detailed explanations and nursing care for exemplars, see nutrition, medical–surgical, pediatric, and gerontology textbooks.

Featured Exemplars

Anorexia Nervosa

Anorexia nervosa is one of a group of psychiatric conditions associated with a fear of weight gain and distortion of body image. It is characterized by an avoidance of food consumption often combined with excessive exercise with the intent to lose weight. Untreated, patients with anorexia nervosa experience extreme weight loss and muscle wasting, representing a condition of insufficient nutrition. This condition is most common among adolescent females, but it is seen in both genders and can occur in childhood or adulthood.

Celiac Disease

Celiac disease (CD) is an autoimmune disorder whereby an inflammatory reaction occurs in the intestine when the mucosa is exposed to gluten, a protein found in wheat, rye, and barley. Oats in their pure form are not a problem but are often excluded because they may be exposed to the other grains during processing. CD is diagnosed based on the presence of flattened villi, as well as specific antibodies in the blood. Commonly reported symptoms are abdominal discomfort, bloating, diarrhea, and nausea. A long-term consequence of untreated CD involves serious malabsorption of nutrients.

There are milder forms of gluten sensitivity with fewer symptoms, but the autoimmune response to the grain proteins still requires a strict gluten-free diet. One consequence of not

BOX 14.1 EXEMPLARS OF IMPAIRED NUTRITION

Conditions Associated With Insufficient Nutrition

- Anorexia nervosa
- Bulimia
- Fat malabsorption syndrome
- Iron deficiency anemia
- Protein–calorie malnutrition
- Vitamin deficiencies (A, B-complex, C, D, K)
- Zinc deficiency

Conditions Associated With Excessive Nutrition

- Obesity
- Dyslipidemia
- Obesity-related conditions
  - Metabolic syndrome
  - Type 2 diabetes mellitus
  - Heart diseases
  - Stroke
  - Hypertension
  - Colon and hormonal cancers (prostate, breast)

Conditions Associated With Altered Digestion/Metabolism

- Lactose intolerance
- Celiac disease
- Gastroesophageal reflux
- Phenylketonuria

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following the diet includes non-Hodgkin lymphoma later in life. Because true CD has a serious prognosis, it is important that a medical diagnosis distinguishes between the disease and the sensitivity so that a lifelong strict diet can prevent comorbidities.[17] The use of a gluten-free diet for weight loss in healthy individuals is not advisable, as it can lead to inadequate intakes of B-complex vitamins and iron.

Obesity

The most common form of excessive nutrition, obesity occurs when there is a chronically high intake of calories. Overweight is defined as *having a BMI greater than 25;* obesity is associated with a BMI greater than 30 or being more than 20% over ideal body weight. Obesity is multifactorial and can include overeating, inactivity, and genetics. Consequences such as type 2 diabetes, heart disease, and stroke affect individuals of all ages and can lead to medical complications or a shortened life span. Obesity is associated with systemic, chronic low-grade inflammation and metabolic dysregulation.[18] It is estimated that more than 66% of the U.S. population (including adults and children) is classified as overweight or obese.

Dyslipidemia

Dyslipidemia is characterized by altered serum lipids (cholesterol, triglycerides, and/or phospholipids) in adults and children with obesity. Some individuals have a genetic predisposition for dyslipidemia, and the role of lipoprotein (a), a strong risk factor for atherosclerotic heart disease, is under study.[19]

Infectious Disease

Nutritional status affects the body's ability to fight inflammation and infections such as the common cold, influenza, tuberculosis, HIV-AIDS and COVID-19. Immune-enhancing properties are available from nutrient dense foods that contain vitamins (C, D, and E) and minerals (zinc, copper, calcium, selenium) as well as high quality proteins. Thus, an antiinflammatory Mediterranean diet is recommended. This diet contains high intake of minimally processed fruit, vegetables, legumes, olive oil, whole grains, nuts, monounsaturated fats; low to moderate intake of fermented dairy products, fish and fish oils, lean poultry, wine; and low consumption of processed and red meats.[20] Note that some people will benefit from a daily multivitamin-mineral supplement that meets but does not exceed DRI levels.

CASE STUDY

From berna namoglu/iStock/Thinkstock.

Case Presentation

Mary Williams is a 62-year-old female who is 5′4″ and weighs 223 lbs. Mary has stage 4 CKD, poorly controlled type 2 diabetes, and class II obesity. She was "chunky" as a child and adolescent, with a lifetime habit of having consumed a relatively high-fat, high-calorie diet. As she recalls, her entire family was overweight, and she believed she had little control over her obesity.

After marriage, she gained excess weight with each of her three pregnancies and was never able to lose all the weight. Throughout her career, she worked as a legal assistant. She spent most of her free time watching her children do various activities or watching television, and she freely admits she has not really exercised since high school.

Following the death of her husband 5 months ago, Mary moved into a one-bedroom apartment within a long-term senior healthcare center. Soon after moving to her new residence, she experienced acute heart failure, which was subsequently resolved. She was also told by her physician that her kidneys were "on the verge of failing." The episode of acute heart failure and the realization that she could have renal failure frightened Mary, so she has become very engaged in her care, making an effort to follow medical recommendations.

She has met with a registered dietitian nutritionist who has devised a specific nutrition therapy plan for Mary. As part of the plan, Mary has been advised to follow a controlled carbohydrate diet with a protein limit of 1 g of protein/kg and moderate intake of sodium, potassium, and phosphorus. She was also switched to a basal/bolus insulin regimen. She takes insulin at mealtimes based on the percentage of meal intake corresponding to the insulin-to-carbohydrate ratio. For 3 months, she has successfully adhered to the treatment strategies, maintaining optimal blood glucose levels, meeting dietary goals, and maintaining a stable weight.

Case Analysis Questions

1. Consider the scope of the concept of nutrition. Where does this case fit within the scope of nutrition?
2. In her history profile, it is mentioned that Mary has class II obesity. What does this mean, and how was it determined that she has class II obesity?
3. Based on this case, what physiologic consequences is Mary experiencing as a result of her nutritional state?
4. How do the clinical management strategies outlined in Mary's case compare to those presented in the concept? Are there other strategies that might be helpful to Mary?

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CONCEPT 15

Elimination

Tammy Williams

Elimination is a concept that has various applications across multiple disciplines, including mathematics, economics, chemistry, and biology. From a biologic perspective, elimination is a concept applicable to all living organisms—from the smallest of microbes to plants, animals, and humans. This concept presentation focuses on elimination as a physiologic concept, as it applies to humans and includes normal or expected elimination patterns and problems associated with elimination.

DEFINITION

Broadly speaking, the term *elimination* refers to the removal, clearance, or separation of matter. From a human physiologic perspective, the term elimination is defined as *the excretion of waste products.*[1] The human body eliminates various forms of waste through the skin, kidneys, lungs, and intestines. This concept presentation focuses on elimination of waste from the urinary system and the gastrointestinal system. For the purposes of this concept presentation, bowel elimination is defined as *the process of expelling stool* (also referred to as feces). Terms used to describe the process of bowel elimination include defecation, defecate, or bowel movement. Urinary elimination is defined as *the process of expelling urine.* Terms used to describe this process include *micturition* or *urination.* The term *continence* refers to the purposeful control of urinary or fecal elimination.

Impaired elimination refers to one or more problems associated with the elimination process. There are many terms associated with impaired urinary elimination including *anuria* (absence of urine), *dysuria* (painful urination), *polyuria* (multiple episodes of urination, as with diabetes), urinary *frequency* (multiple episodes of urination with little urine produced in a short period of time), and urinary *hesitancy* (the urge to urinate exists, but the person has difficulty starting the urine stream).

SCOPE

The scope of this concept includes the normal or expected physiologic process of waste formation and excretion by the gastrointestinal and renal systems as well as problems associated with this process (Fig. 15.1). Each of these body systems are complex and differ significantly from an anatomic and physiologic perspective. The kidneys are responsible for the removal of metabolic waste and other elements from the blood in the form of urine, and the gastrointestinal tract is responsible for the removal of digestive waste in the form of stool. Despite these differences, similarities are clear when considering this from a conceptual lens. In both systems, the process involves the formation and excretion of waste. The scope of this concept also includes impairment of urinary and bowel elimination, representing a wide range of problems and conditions.

NORMAL PHYSIOLOGICAL PROCESS

Because of the significant differences between urinary and bowel elimination, an overview of the normal physiologic process for each is presented separately.

Normal Urinary Elimination

Urinary elimination involves the process of waste formation (production of urine) and the excretion of urine involving several specific structures. The kidneys, ureters, bladder, and urethra must all function adequately for normal urination to occur.

Formation of Urine

The removal of metabolic waste from the blood by the urinary system represents an essential process needed to maintain physiologic homeostasis and regulation. The main functional unit of the kidneys is the nephron; each kidney has more than 1 million nephrons. Each nephron is composed of two parts—blood vessels and renal tubules. Optimal physiologic effect depends on continuous perfusion of a large volume of blood (an average of 1 L/min) to the kidneys and functioning nephrons.

The formation of urine is complex and involves three main processes: glomerular filtration, tubular reabsorption, and tubular secretion. Blood enters the kidney through the renal artery, which then branches into progressively smaller arteries, arterioles, and, finally, a cluster of capillaries known as the glomerulus (Fig. 15.2). The glomerulus is a semipermeable membrane that serves to filter blood into a C-shaped structure of the renal

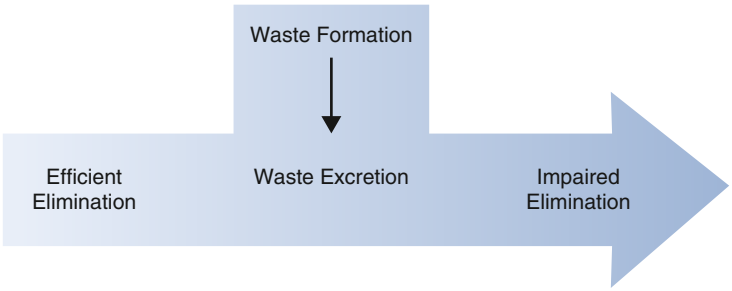

FIG. 15.1 Scope of Elimination.

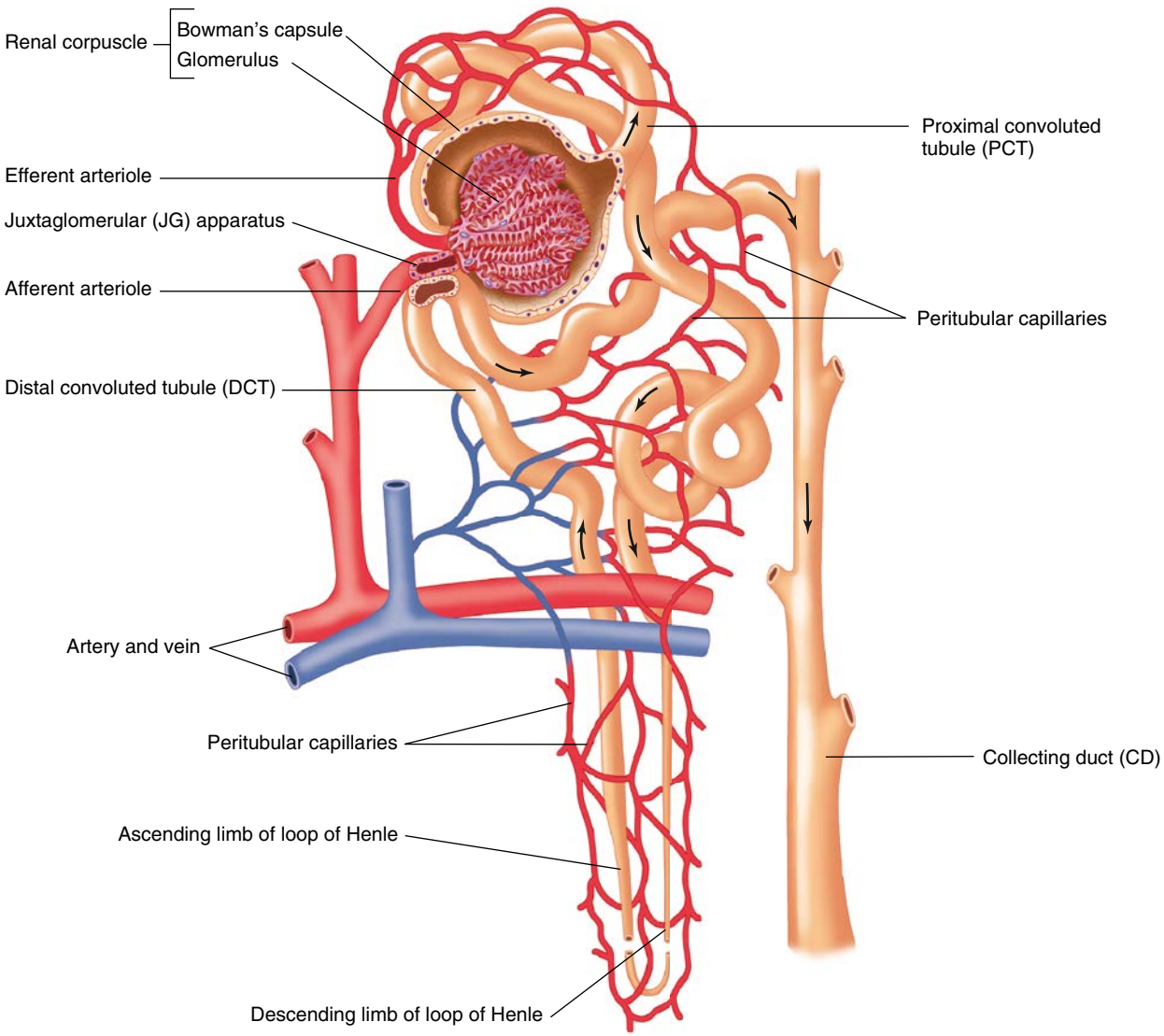

FIG. 15.2 The Nephron. (Modified from Patton, K. T., & Thibodeau, G. A. [2014]. *The human body in health and disease* [6th ed.]. St Louis: Mosby.)

tubule known as the Bowman capsule. This process *(glomerular filtration)* represents the beginning of urine formation.

The filtrate contains water, electrolytes, and waste that have been removed from the blood. As the filtrate passes through a sequence of renal tubules (from the Bowman capsule to the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule; see Fig. 15.2), a network of capillaries surrounding the renal tubules reabsorb most of the water, electrolytes, and other necessary elements back into the blood. This process is referred to as *tubular reabsorption.* The third process, *tubular secretion,* involves a secondary process for small amounts of select substances (e.g., potassium, hydrogen, ammonia, and drugs) to be moved from the blood in the capillaries surrounding the tubules into the tubules. The amount

of water and electrolytes reabsorbed into the blood or excreted in the renal tubules is controlled by several hormones, particularly aldosterone, antidiuretic hormone, parathyroid hormone, renin, and atrial natriuretic factor.

Excretion of Urine

Urine formed in the renal tubules moves into the collecting duct and then into the renal pelvis, the ureter, and the bladder, where it is stored until urination occurs (Fig. 15.3). The bladder holds approximately 300 to 500 mL in adults (much less volume in children) before the pressure stimulates stretch receptors in the bladder wall. The stretch receptors send nerve impulses through the spinal cord to signal the need for urination. An internal sphincter, composed of smooth muscle, contracts involuntarily to prevent urine from leaking out of the bladder. The external sphincter, located just below the internal sphincter and surrounding the upper part of the urethra, is composed of skeletal muscle and is voluntarily controlled. Thus, the process of urination involves a series of nerve signals between the bladder and spinal cord to trigger the micturition reflex; this causes the internal sphincter muscles to relax and bladder wall contraction. With the voluntary relaxation of the external urinary sphincter, urine passes out of the body through the urethra. The external urinary sphincter must be under the individual's control for urinary control (continence) to be successful.

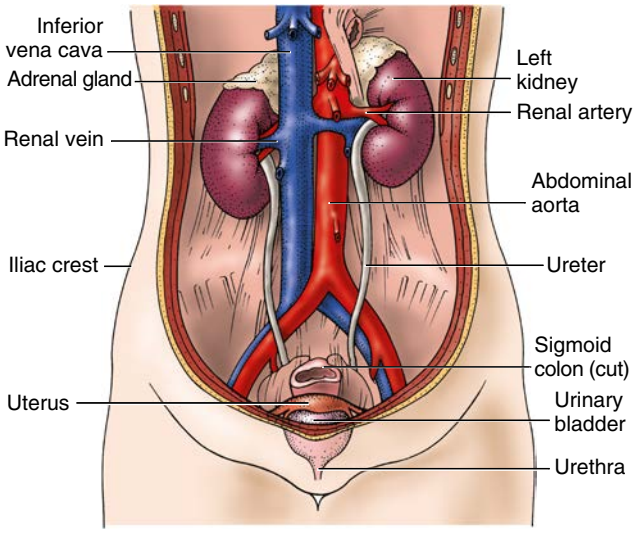

FIG. 15.3 Urinary Elimination. (From Ignatavicius, D. D., & Workman, M. L. [2021]. *Medical surgical nursing: Patient-centered collaborative care* [10th ed.]. St. Louis: Elsevier.)

Normal Bowel Elimination

Digestion and the Formation of Stool

The gastrointestinal system has two overarching functions: the breakdown and absorption of nutrients from foods ingested and the elimination of waste from this process. The gastrointestinal system extends from the mouth to the anus. The first part of the gastrointestinal tract (mouth, esophagus, stomach, and small intestines) is involved in the digestion and absorption of nutrients, a process that also involves other digestive organs, including the liver, gallbladder, and pancreas (Fig. 15.4). The digestive process is described further in Concept 14, Nutrition.

The process of waste formation occurs in the colon. The waste product, known as stool or feces, are comprised of water, bile, undigested food matter, unabsorbed mineral, bacteria, mucous, and epithelial cells from the lining of the intestines. Smooth

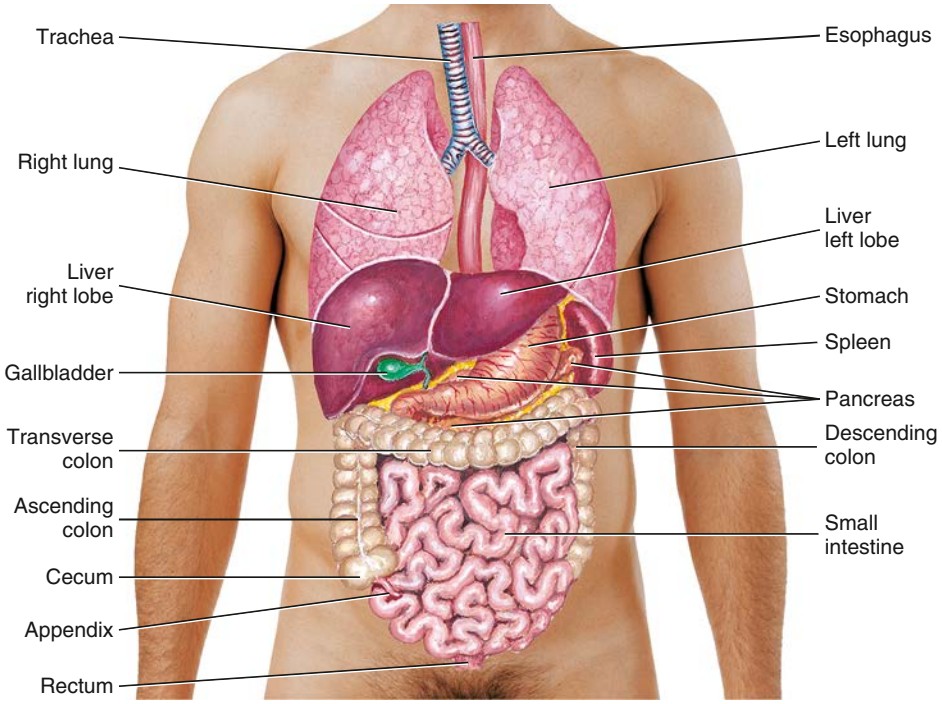

FIG. 15.4 The Gastrointestinal Tract. (From Wilson, S., & Giddens, J. [2022]. *Health assessment for nursing practice* [7th ed.]. St Louis: Elsevier.)

muscles within the intestinal tract stimulate peristalsis, which helps move the fecal matter through the gastrointestinal tract. The large intestine, which is 5 or 6 feet long and approximately 2 inches in diameter, has four parts: the cecum (and appendix), the colon, the rectum, and the anus (see Fig. 15.4). The function of the large intestine is to absorb water and electrolytes as fecal matter moves through its walls. Mucus in the intestine helps lubricate the walls and aids in the expulsion of the stool. If there is excessive peristalsis and the stool moves through the large intestine quickly, less water is absorbed, resulting in a loose stool. If the peristalsis is reduced, feces pass through the large intestine slowly, resulting in greater absorption of water and a harder stool.[2]

Elimination of Stool

The process of expelling stool is referred to as defecation, which is a reflexive action involving both voluntary and involuntary control. When the stool reaches the rectum, pressure stimulates parasympathetic nerve fibers in the sacral aspect of the spinal cord, which then produces contraction of the rectum with a relaxation of the internal anal sphincter. These actions result in an urge to defecate. The urge to defecate can be suppressed until the person is in an appropriate environment. At that time, the individual voluntarily relaxes the external anal sphincter to allow passage of the stool.

Age-Related Differences

Infants, Toddlers, and Children

Patterns of elimination change in the first few years of life. Infants and toddlers initially lack control over the sphincters and muscles that control urination and bowel elimination, but control is attained during early childhood as a normal developmental milestone. Children are typically 18 to 24 months of age before they are able to identify the urge to urinate and defecate.[3] Toilet training by the parent or caregiver helps the child obtain conscious control of his or her bowel and bladder functions. Most children are ready for "potty training" between ages 2 and 3.[3]

Pregnant Person

Pregnancy can affect elimination patterns because the fetus in the abdominal cavity affects both bowel and bladder function. As the fetus grows, increased pressure is placed on the bladder, and frequent urination is required. The pregnant individual will have larger volumes of urine because of greater blood volume during the gestation. The growing fetus can also interfere with intestinal peristalsis and can cause constipation. The use of prenatal vitamins with iron can also contribute to constipation in the pregnant female.[4]

Older Adults

A number of physiologic changes associated with aging affect elimination. By age 80 years, renal blood flow reduces to an estimated 600 mL/min, and the kidneys lose up to 50% of functioning nephrons for a variety of reasons, including changes in size of the kidney and sclerosis. In the absence of disease, this does not change the older adult's ability to produce urine sufficiently to maintain normal composition of body fluids, although it represents reduced renal reserve, making the older adult more susceptible to fluid and electrolyte imbalances and kidney damage due to medications. Although the bladder retains tone with age, the volume of urine that can be held reduces, leading to urinary frequency. In many older adults, muscles around the urethra become weak, thus increasing the risk of incontinence.

Age-related changes affecting bowel elimination include atrophy of smooth muscle layers in the colon and reduced mucous secretions. Reduced tone of the internal and external sphincter as well as reduced neural impulses (reducing the sensation of bowel evacuation) can make the older adult more susceptible to constipation or incontinence.

VARIATIONS AND CONTEXT

Alterations in elimination can occur with urinary or gastrointestinal function and represent a wide spectrum of problems. Most problems and conditions can be grouped by common themes and include incontinence, retention, discomfort, infections and inflammation, neoplasms, and organ failure.

Control

The ability to control the elimination of urine and stool is an important physiologic function. The term *incontinence* refers to the loss of control of either urine or bowel elimination. Control issues arise as a result of undeveloped elimination mechanisms, malfunctions in the mechanism of elimination, alterations in cognition, or with significant urge and the inability to access a bathroom. Nearly all individuals experience either fecal or urinary incontinence during their lifetime. Individuals who are incontinent are at risk for skin breakdown (particularly if bedridden) and can potentially experience changes in daily activities, functional activities, and social relationships.

Urinary incontinence is a disruption in the storage or emptying of the bladder with involuntary release of urine usually associated with dysfunction of the external and/or internal urinary sphincters.[5] It can range from light urine leakage when coughing or laughing (stress incontinence) to full loss of continence. Factors affecting urinary incontinence may be psychological or physical, such as depression, anxiety, cognitive impairments, or acute injury or surgical procedures.[6,7] Types of urinary incontinence are listed in Table 15.1.

Fecal incontinence is the involuntary passage of stool and ranges from an occasional leakage of stool while passing gas (flatus) to a complete loss of bowel control. Fecal incontinence most commonly occurs with diarrhea, particularly when it is associated with forceful intestinal peristalsis (cramping). Complete fecal incontinence occurs with the loss of sphincter control—usually as a result of traumatic injury, pathologic changes to the rectum, or neurologic injury. Fecal incontinence also can occur as a result of cognitive changes.[8,9]

Retention

Retention refers to the unintentional retention of urine or stool. Retention problems can occur at any age. The primary mechanisms causing retention are usually associated with obstructions, inflammation, or ineffective neuromuscular activation within the bladder or the gastrointestinal tract.

TABLE 15.1 Types of Urinary Incontinence

Type of Incontinence	Description
Stress	Leakage of small amounts of urine during physical movement (coughing, sneezing, exercising)
Urge	Leakage of large amounts of urine at unexpected times, including during sleep
Overactive bladder	Urinary frequency and urgency, with or without urge incontinence
Functional	Untimely urination because of physical disability, external obstacles, or cognitive problems that prevent person from reaching toilet
Overflow	Unexpected leakage of small amounts of urine because of full bladder
Mixed	Usually occurrence of stress and urge incontinence together
Transient	Leakage that occurs temporarily because of a situation that will pass (infection, taking a new medication, colds with coughing)

Urinary retention occurs as either incomplete emptying of the bladder after urination or a complete inability to urinate and is caused by a number of factors. Incomplete emptying can occur due to malfunction in nervous system innervation to the bladder or mechanical change in the shape of the bladder that causes retention.[10] For example, women may experience urinary retention if there is hard stool that presses against the bladder or rectoceles or cystoceles that cause prolapse of the bladder and trapping of urine. Retention can also occur when an obstruction blocks the passage of urine (e.g., an enlarged prostate) or when the external sphincter of the bladder does not relax, allowing the urine to be expelled from the bladder. Medications that may cause urinary retention include antidepressants, anticholinergics, and antihistamines.[11] Postoperative patients may have problems with urinary elimination as a result of the effects of anesthetics or the use of catheters during the surgical procedure. Psychosocial factors (e.g., fear or anxiety) may also affect the ability to successfully void.

Retention of stool occurs when the person is unable to pass stool successfully from the rectum. This condition is not normal for the young, but it may occur if the "urge to defecate" is ignored and stool becomes difficult to eliminate. Stool retention may occur as a side effect to many medications, including narcotic pain medications or can occur secondarily to reduced peristalsis or intestinal blockage. Stool retention usually results in constipation, defined as *the difficult passage of hard, dry stool.* Ongoing retention of stool causes loss of appetite, discomfort, and potentially fecal impaction.[12]

Discomfort

The process of elimination should normally be free of pain or discomfort; in the case of significant urgency, the process of elimination can actually relieve discomfort. The most common causes for urinary discomfort are associated with inflammation (often associated with infection) of the urinary tract or bladder distention associated with urinary retention. Pain associated with urinary tract infection (UTI) is often described as a burning pain. Pain also can be associated with irritation when urine comes in contact with lesions on the genitalia.

Common causes of discomfort associated with bowel elimination include constipation, excessive flatus, abdominal cramping, and diarrhea. Other causes of discomfort include inflammation or injury to the anus, the presence of hemorrhoids (both internal and external), anal fissure, and gastrointestinal infection or inflammation. Chronic conditions such as colitis or irritable bowel syndrome are also commonly associated with discomfort. In children, there can be telescoping of the bowel back into itself (intussusception) that can result in abdominal pain from obstruction and retention of stool.[13]

Infections and Inflammation

Elimination problems also can be caused by inflammatory or infectious conditions. Infection in the urinary system is often referred to as UTI, but specific structures in the urinary system can become inflamed or infected, including the kidney (nephritis), the renal pelvis (pyelonephritis), and the bladder (cystitis).

Acute intestinal inflammation and infection are most commonly associated with viral infections or food poisoning. Chronic inflammatory conditions of the intestinal tract include colitis and diverticulitis or autoimmune disorders. Inflammation and infections are usually associated with abdominal pain and discomfort (sometimes severe) and can potentially lead to nutritional deficits or intestinal perforation.

Neoplasms

Neoplasms are tumors and can have an effect on urinary and bowel elimination. Benign and malignant neoplasms of the prostate often lead to blockage of urinary flow in men. Tumors can also occur in the kidney or bladder, but these are less common. Neoplasms in the intestinal tract are also common and include benign growths (e.g., polyps) and cancerous lesions in the intestine, colon, or rectum.[14]

Organ Failure

One additional category of problems related to elimination is organ failure. The most obvious organ that comes to mind is the kidney. Renal failure can occur suddenly, usually associated with an injury to the kidney (referred to as acute kidney injury [AKI]), or it can occur as a slow, chronic process (referred to as chronic kidney disease [CKD]), whereby the kidneys lose functional capacity over months to years. The inability to remove metabolic waste and fluid creates significant physiologic challenges. The failure of other key organs, such as the heart, the liver, and the pancreas, also hampers elimination efforts. For example, heart failure and shock reduce blood flow to the kidneys and gastrointestinal system, thereby reducing the efficiency of urine production and removal as well as formation of stool. Removal of the small or large intestines because of injury or disease also results in significant changes in elimination.

CONSEQUENCES

A number of consequences occur associated with impaired elimination processes and are linked to the underlying problem.

- Consequences associated with incontinence range from the potential for skin breakdown and falls (if associated with

urgency) to social, lifestyle, and relationship consequences and depression and withdrawal.

- The consequences of urinary retention include pain, chronic bladder infection, and bladder distention. Bladder distention can lead to urinary reflux (a backflow of urine from the bladder into the ureters), causing dilation of the ureters and renal pelvis, and can lead to pyelonephritis and renal atrophy.
- The complete loss of renal function represents significant physiologic consequences. The inability to remove toxins and metabolic waste results in fluid and electrolyte and acid–base disturbances and leads to death if untreated.
- The consequence of excessive fecal retention includes pain, loss of appetite, nausea, and vomiting.
- An ileus refers to a loss of peristaltic activity in the gastrointestinal tract. This can occur subsequent to abdominal trauma or surgery and is associated with nausea, vomiting, and distention. Although rare, rupture of the colon can occur, representing a life-threatening situation.

RISK FACTORS

Elimination represents normal physiologic function; thus, problems with the elimination of urine and stool and can affect any person regardless of age, gender, or race. It is a challenge to adequately summarize all risk factors for problems affecting elimination because each condition has its own unique risk factors. However, there are a few universal risk factors for the majority of problems affecting normal elimination. The single greatest risk factor for altered elimination is advanced age because of physiologic changes associated with aging process. Other general risk factors common to most elimination problems include individuals with altered cognition, impaired mobility, the debilitated, injuries or pathology affecting the neurologic system, spine, or pelvic organs. There is also a high correlation between some elimination problems—urinary and fecal incontinence, as one example.[15] Also, many medications are known to cause changes in elimination—general anesthesia[16] and opioids as common examples. Table 15.2 presents specific risk factors for retention and incontinence.

TABLE 15.2 Common Risk Factors for Incontinence and Retention

	Persistent Incontinence	Retention
Urinary	Advanced age Female Menopause Multiparity Obesity Smoking Impaired mobility Trauma or surgery pelvic region Impaired cognitive, debilitated state Neurologic disorders (such as stroke, spinal injury, brain tumor)	Advanced age Male Prostate enlargement, inflammation, or infection Pelvic organ prolapse Pelvic mass Pelvic trauma/surgery Medications (anticholinergics, sympathomimetics)
Fecal	Advanced age Diarrhea Impaired mobility Impaired cognitive, debilitated state Injury, chronic condition affecting rectal neuropathway	Advanced age Female Pregnancy Lower income Poorly educated Sedentary lifestyle Dehydration Chronic conditions (inflammatory bowel syndrome, depression) Medications (opioids, diuretics, antidepressants, aluminum-based antacids)

ASSESSMENT

Assessment of elimination includes taking a history, conducting a physical examination, and performing diagnostic testing when problems are identified.

History

Conducting a history is the first step to understanding problems associated with elimination. Ask about patterns of urinary and bowel elimination, including frequency, appearance of stool and urine, and associated symptoms. Common symptoms directly related to elimination include alterations in elimination patterns; changes in the appearance, frequency, or quality of stool or urine; or discomfort and difficulty associated with elimination. A symptom analysis approach is helpful to fully understand the symptom. Determine whether there have been changes in diet, recent changes in health status (e.g., cognition, mobility, functional ability, or other medical conditions), and if there are new medications or changes in medications. Voluntary or involuntary (incontinence) emptying of the bowel or bladder also must be assessed to determine the impact of the condition on the individual. Adults of all ages should be asked about urinary continence because it is an underreported phenomenon.

Examination Findings

Physical assessment incorporates four examination techniques: inspection, auscultation, palpation, and percussion.

Inspection

The abdomen is inspected for contour; abdominal or bladder distention is an abnormal finding. The genitalia are also inspected to examine the urinary meatus for evidence of redness, lesions, or discharge. Discharge from the urinary meatus is an abnormal finding and may suggest infection, especially if the patient reports pain with voiding. Observe the perianal area. The area should be free from redness or lesions; the presence of hemorrhoids or an anal fistula may be observed if the patient complains of pain with defecation.

Inspection also includes looking at a stool or urine sample if available. Urine should be clear and yellow with mild odor. Very dark urine may be indicative of dehydration, may be a side effect of medication, or may indicate the presence of blood. Stool should be brown and formed. Stools that are black and tarry in appearance often signal gastrointestinal bleeding. Loose

stools or diarrhea may be associated with diet, inflammation, or infection.

Auscultation

Auscultation is limited to the abdomen to listen to bowel sounds. Bowel sounds should be heard in all four quadrants. An absence of bowel sounds may be associated with paralytic ileus; hyperactive bowel sounds may be noted with gastrointestinal inflammation or with an intestinal obstruction.[17] Auscultation is not indicated in urinary assessment.

Palpation

Abdominal palpation is a physical examination technique for both urinary and bowel elimination. The abdomen should be soft and nontender with palpation over the entire abdomen and over the urinary bladder. Abdominal or urinary distention is considered an abnormal finding and may be associated with reduced peristalsis or retention of stool or urine.

Rectal palpation is done to assess the rectal sphincter and to examine for the presence of masses, lesions, or impacted stool. Digital palpation is also part of the prostate examination.[17] Although this is not directly an examination associated with elimination, prostate enlargement can result from a tumor (benign or malignant) or inflammation; both can contribute to urinary retention.

Diagnostic Tests

There are a number of diagnostic tests associated with elimination. In general, the diagnostic tests are classified into one of three categories: laboratory, radiographic, and direct observation.

Laboratory Tests

Urinalysis. A urinalysis is one of the most common of all laboratory tests. It is useful for screening a number of conditions not associated with a problem in elimination and is obtained with either a sterile urine specimen or a clean-catch specimen. Bacteria indicate infection, whereas blood may indicate damage from infection or trauma to the urinary system. Urinary analysis that indicates the presence of bacteria or blood components in the urine may require further assessment of the urinary tract by a physician specialist in the field of urology.

Renal function tests. Laboratory tests assessing renal function include blood urea nitrogen, blood creatinine, and creatinine clearance tests. Creatinine and blood urea nitrogen are excreted entirely by the kidneys and, therefore, provide a measure of renal function.

Culture. Urine and stool cultures are relatively common laboratory tests. When a UTI is suspected, a urine culture determines the presence and type of organism causing the urinary infection. Stool cultures are indicated when a parasitic infection is suspected.

Occult blood. When blood is suspected in stool, an occult blood test is indicated. It also represents a basic screening that should be performed as part of a rectal examination. The presence of blood in the stool could be related to a gastrointestinal bleed (inflammation and infection), hemorrhoids, or tumors.

Pathology

A biopsy is a sample of tissue or cells that undergoes pathologic evaluation. A biopsy can be taken from the rectum, colon, bladder, or kidney. Biopsies provide information associated with tumors or with general organ function.

Radiographic Tests and Scans

Numerous radiographic tests are used to assess elimination. Common radiographic tests include x-rays, computerized tomography, magnetic resonance imaging, and ultrasound. These are used to detect a variety of problems, including the presence of an intestinal tumor, a congenital renal abnormality, or kidney stones. Angiography is used to assess renal blood flow and can detect renal artery stenosis.

Direct Observation Tests

The ability to directly observe internal organs can be accomplished with scopes. With regard to the Concept of Elimination, scopes can be used to visualize the colon *(colonoscopy),* the sigmoid colon *(sigmoidoscopy),* the bladder *(cystoscopy),* or the urethra or ureters *(uroscopy).*

Direct visualization of the colon is done for screening or diagnostic purposes for polyps, cancer, and inflammatory conditions such as Crohn's disease. Direct visualization of the bladder or ureters is done with a special scope as part of diagnostic or surgical procedures.

Other Diagnostic Tests

Several special tests are available to evaluate urinary elimination, including bladder stress testing, uroflowmetry and other urine flow studies, and postvoid residual measurement through the use of bladder scans or postvoid catheterization.

CORE COMPETENCIES

Elimination

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to supporting elimination.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to elimination.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to elimination management for individuals.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address conditions associated with elimination.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to elimination conditions.
- Demonstrate clinical judgment founded on broad knowledge of elimination.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention measures are aimed at maintaining optimal health and preventing the onset of disease through the reduction of risks. The foundation of primary prevention efforts, as it relates to this concept, includes awareness of environmental

factors, maintaining a healthy diet, hydration, physical activity, and following optimal toileting practices.

Environmental Factors

Avoidance of contaminated water and foods can assist in maintaining consistent bowel habits. Bacteria in water or food can cause diarrhea and colitis. Parasites can be present in water or food that is not properly prepared. Parasites not only can cause elimination problems but also can affect overall health. Laboratory testing can determine whether parasites are present in the gastrointestinal system that may be causing problems with bowel elimination.

Maintaining Hydration

Water is a key element for prevention of bowel and urinary elimination problems. Water is absorbed by the stool to soften it and promote intestinal motility, which assists in the elimination of stool. Water serves the urinary system in that it increases volume, reduces bladder irritation, and helps eliminate toxins from the body.

Dietary Fiber

Fiber intake has been shown to prevent stool retention, especially when combined with adequate water intake and exercise. Fiber creates enough friction along the bowel surface that it can assist in the production of a bowel movement. Adequate fluid intake with the fiber is imperative. Fiber should be slowly added to the diet to prevent abdominal discomfort and excessive gas formation in the intestine. The U.S. Food and Drug Administration recommends 28 g of fiber/day, based on a 1000 kcal diet.[18]

Physical Activity

Physical activity is known to increase intestinal peristalsis which reduces the time for food matter to move through intestines. By decreasing the time it takes feces to move through the large intestine, less water is reabsorbed. For this reason, exercise helps prevent constipation.[12]

Maintenance of Regular Toileting Practices

Maintaining a consistent time of defecation is important in the regulation of bowel movements. The use of familiar toileting facilities may also encourage defecation. Avoidance of foods that cause discomfort during digestion and absorption or are known to cause constipation can also help maintain regular patterns of bowel elimination. To prevent urinary incontinence or retention, there should be timely and complete emptying of the bladder. Holding urine should be discouraged because this encourages bacterial growth in the bladder and consequent UTI.

Secondary Prevention (Screening)

Two common screening tests associated with elimination are screening for occult blood and colonoscopy—both are considered effective for the detection of colon cancer. The U.S. Preventive Services Task Force (USPSTF) recommends screening for colorectal cancer beginning at age 50 years until 75 years of age (recommendation grade A).[19] The two categories of screening are stool-based tests and direct visualization tests. Stool-based tests (guaiac-based fecal occult blood test, fecal immunochemical test, or multitargeted stool DNA test) are recommended annually; the guaiac-based test is routinely done as part of a rectal exam. Direct visualization tests include colonoscopy or sigmoidoscopy. These are recommended every 10 years (or more often with certain risk factors). Such tests allow direct visualization of the colon and removal of precancerous lesions, averting the development of colon cancer.

Screening for prostate cancer is the only screening associated with urinary elimination. The recently revised recommendation is for periodic prostate-specific antigen (PSA)-based screening of men ages 55 to 69 to be an individualized decision, after weighing risks and benefits associated with screening with their healthcare provider (recommendation grade C). The USPSTF recommends against screening for prostate cancer in men over the age of 70.[20] The USPSTF reports insufficient evidence to support routine screening for bladder cancer.[21]

Collaborative Interventions

Problems with elimination represent a wide range of conditions involving two major body systems—the gastrointestinal system and the urinary system. For the purposes of this concept, common interventions are only briefly described; detailed information is available in various nursing textbooks.

CLINICAL NURSING SKILLS FOR ELIMINATION

- Assessment
- Urinary catheterization
- Suprapubic catheter care
- Catheter irrigation
- Enema
- Nasogastric tube for gastric decompression
- Ostomy care
- Medication administration

Pharmacologic Agents

Antibiotics. Infections of the kidney and urinary tract are treated with antibiotics. Antibiotics are selected based on the results of culture and sensitivity testing and the provider's best judgment. Although a variety of agents are used, trimethoprim, trimethoprim with sulfamethoxazole, or nitrofurantoin are commonly prescribed for UTIs; parenteral antibiotics are indicated for more severe infections such as pyelonephritis. Antibiotics may also be used prophylactically with urinary retention or recurrent UTI.

Diuretics. Diuretics increase the volume of urine produced along with excreting sodium and potassium from the body by affecting the water resorption in the renal tubules. Loop diuretics prevent reabsorption of sodium in the loop of Henle. Thiazide diuretics prevent sodium from being reabsorbed at the beginning of the distal convoluted tubules. Potassium-sparing diuretics stop the extensive loss of potassium at the distal

convoluted tubules. Excessive use to treat certain conditions requires careful monitoring and frequent lab testing of the electrolytes.

Antispasmodics. Anticholinergics are often used to relieve smooth muscle spasms in the bowel or bladder. Bladder spasms can occur as a consequence of neurologic injury. Anticholinergics can reduce bladder spasms and can provide relief from urinary incontinence. Bowel spasms commonly occur with irritable bowel syndrome. Some antispasmodic medications, such as Imodium (loperamide), are effective for the treatment of diarrhea because they cause a reduction in peristalsis and slow the passage of stool.

Agents to manage constipation. Pharmacologic management to treat stool retention includes both prescribed and over-the-counter versions of laxatives, bulk-forming agents, bowel stimulants, lubricants, stool softeners, saline laxatives, and enemas. The drawback in using these medications is that the bowel can become dependent on laxatives and stimulants for the impulse to defecate. Medications for stool retention should be a last resort and discontinued as soon as the bowel elimination is achieved.

Analgesics. Analgesics are indicated for relief of mild discomfort to severe pain for select urinary or bowel elimination conditions. Examples of conditions causing pain with elimination include kidney stones, cystitis, UTIs, bladder spams, hemorrhoids, and rectal fissures.

Incontinence Management

Multidisciplinary management of the person with alterations in elimination must occur to successfully control the condition. The need for retraining the bowel and bladder is of paramount importance. Providing a regular toileting schedule, managing fluid intake, modifying the environment, avoiding indwelling catheters, providing high-quality skin care and assessment, and avoiding medications that contribute to incontinence are nursing actions that will promote urinary continence. The use of an external urinary collection (EUC) device such as PureWick, is a non-invasive approach for managing female incontinence.[22] Personal absorbent pads or bed-protecting pads may be used to catch episodes of incontinence in both mobile and immobile individuals. Biofeedback may be used to assist the person in gaining improved control over the muscles of elimination. Biofeedback involves placement of sensors onto the affected area of bowel so that the person can receive feedback regarding which muscles are being used to control bowel function. Among those with dementia, toilet assistance (including timed voiding and prompted voiding) along with protective pads and skin care are standard interventions.[23]

Invasive Procedures and Surgical Interventions Involving Urinary Elimination

A variety of procedures are performed as treatment for urinary elimination problems. The benefits must outweigh the risks for utilization of these interventions because they can be invasive and sometimes lifestyle-altering procedures.

Dialysis. Dialysis is indicated for acute or chronic renal failure. It involves filtration of the blood to remove toxins through an external process. Two types of dialysis are hemodialysis and peritoneal dialysis. A dialysis machine is used in hemodialysis to filter a patient's blood to remove excess toxins and water. The blood is circulated from the patient to the dialysis machine and then back to the patient over several hours. In peritoneal dialysis, a dialysate solution is introduced into the peritoneal cavity that absorbs the toxins over several hours; the solution and waste are then removed.

Procedures relieving urinary retention. The most common procedure to relieve urinary retention is urinary catheterization.[24] This can be intermittently performed with a straight catheter, or an indwelling catheter can be inserted. Measures must be taken to prevent complications (e.g., infection) when urinary drainage systems are used for long periods of time.[25]

Surgical intervention may be needed to treat other forms of obstructions, including surgery on the bladder, prostate, or ureters. Many procedures are conducted through a cystoscope. Stents, which are rigid tubes that provide an opening that is not normally present, may be used internally in the urethra and externally as part of anastomosis procedures performed for bladder cancer. Stents maintain the patency of pathways for urinary elimination.

Removing renal calculi. Renal calculi (also known as kidney stones) often require surgical intervention if the stones are unable to pass through the urinary tract. A variety of surgical procedures are available to treat renal calculi, including *lithotripsy* (fragmentation of the stones through sound wave technology); *endourologic procedures* (insertion of a ureteroscope and crushing the stones with a surgical instrument called a lithotrite); or open procedures (*nephrolithotomy, pyelolithotomy, ureterolithotomy,* or *cystotomy*), in which an incision is made and the stone is surgically removed.

Nephrectomy. Occasionally, surgical removal of the kidney is required, as with renal cancer. Other conditions, such as polycystic kidney disease, may also require surgical intervention.

Prostate surgery. An enlarged prostate can cause significant urinary obstruction. A transurethral resection of the prostate is a surgical procedure done for benign prostate hypertrophy when other noninvasive treatment measures have failed. *Prostatectomy* refers to the removal of the prostate and is usually performed among younger men diagnosed with prostate cancer, particularly if diagnosed in early disease stage.

Bladder surgeries. Surgical interventions of the bladder include a wide variety of procedures to treat many types of conditions, such as prolapsed bladder or bladder cancer. Surgical treatment options include laser surgery, transurethral resection, and partial or total cystectomy. If the bladder is removed, urinary diversion is required.

Urinary diversion. Urinary diversion procedures involve diverting the ureters to a urinary stoma on the skin (usually on the abdomen). There are multiple types of diversion procedures that are described in greater detail in many nursing textbooks. Urinary diversion is required with a cystectomy and is also used in the treatment of other conditions, such as bladder cancer, neurogenic bladder, or trauma to the bladder. Maintenance of skin integrity at the stoma site is of great importance. External urinary pouches are used in many cases to collect urine in these types of situations.

Invasive Procedures and Surgical Interventions Involving Bowel Elimination

Surgical procedures for bowel elimination problems are primarily associated with the colon, rectum, and anus, and they treat pathologic conditions or traumatic injury.

Colectomy. A colectomy (also referred to as a *colon resection*) involves removing a portion of the bowel. This may be done because of disease to a portion of the bowel (e.g., a cancerous tumor) or as treatment for traumatic injury. The two ends of the remaining colon are reattached (anastomosed).

Colostomy/ileostomy. Diversion of the intestines (colon or small intestine) through a stoma on the skin is occasionally needed temporarily or permanently as a result of injured or diseased intestine, colon, or rectum. The use of external devices (e.g., a colostomy pouch) is required for the collection of stool. Maintenance of skin integrity around the stoma is of utmost importance.[23]

Rectal prolapse repair. Rectal prolapse is a condition that occurs when the rectum falls into or through the anal opening. This is most common among young children and the elderly. Prolapse can occur from weak pelvic floor muscles or from excessive straining during bowel movements, as with chronic constipation. Surgical repair is indicated if prolapse occurs regularly or is associated with significant discomfort.

Hemorrhoidectomy. This procedure involves the excision of internal or external hemorrhoids. Hemorrhoids may require surgical intervention if topical treatments and changes in diet do not eliminate their associated discomfort. Thus, this procedure is usually only performed for patients with severe pain and multiple thrombosed hemorrhoids or when there is significant prolapse.

Fecal collection systems. A fecal collection system uses a flexible tube inserted into the rectum that is used to collect liquid stool in patients with incontinence who are not candidates for bowel retraining or have *Clostridium difficile* and its resulting diarrhea. These are fecal management systems for liquid stool only and help prevent skin breakdown in cases of severe diarrhea.

INTERRELATED CONCEPTS

A number of interrelated concepts presented in this text are associated with elimination (Fig. 15.5). **Nutrition** has a close interrelationship with bowel and urinary elimination. The types of foods and fluids ingested affect stool formation and urinary elimination. The kidneys play a vital role in maintaining homeostasis of **Fluid and Electrolytes** and **Acid–Base Balance**. Under the direction of hormones, the kidneys retain or eliminate water and electrolytes, which are critical for these balances to be maintained. Also, changes in electrolyte balance can influence neuromuscular transmission of smooth muscles, thus reducing or increasing intestinal peristalsis.

A lack of **Mobility** can result in both urinary and bowel elimination problems. Mobility helps with stimulation of peristalsis. Immobility, particularly when an individual is in a supine position, can lead to ineffective bladder emptying. Finally, changes in **Cognition** increase the potential for complications in both elimination mechanisms and can result from the inability to obtain and maintain adequate food and fluid intake. They can also lead to an inability to recognize cues for elimination—thus leading to incontinence.

CLINICAL EXEMPLARS

Exemplars of alterations in urinary elimination include conditions across the lifespan—ranging from bed-wetting, which may occur as a child is learning to control urinary elimination, to incontinence, which may occur as a person ages and the muscles supporting the bladder become less efficient. Bowel function also spans the life cycle; a variety of issues may affect function as an infant, such as structural problems in the bowel (e.g., strictures and fissures), whereas functional issues such as constipation may occur with advanced age. Box 15.1 presents common exemplars of conditions associated with the Concept of Elimination. Some of the most common exemplars of impaired elimination, urinary, and fecal incontinence have previously been described in the variations and context section of this concept presentation.

Featured Exemplars

Urolithiasis

Urolithiasis refers to the presence of stones called calculi within the urinary tract. Although it is not entirely clear how stones are formed, most contain calcium. Stones can form in the kidney (nephrolithiasis) or within the ureters (ureterolithiasis). The

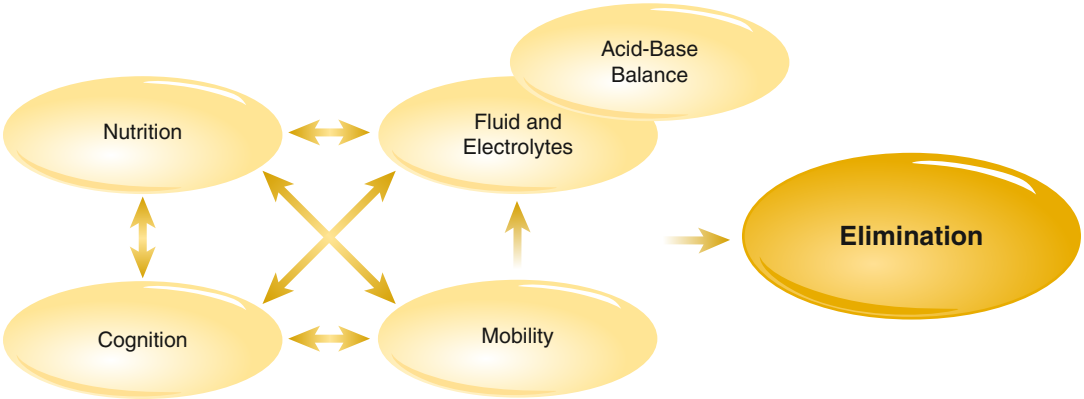

FIG. 15.5 Elimination and Interrelated Concepts.

BOX 15.1 EXEMPLARS OF IMPAIRED ELIMINATION

Incontinence
- Bed-wetting
- Stress incontinence
- Urge incontinence
- Fecal incontinence

Retention
- Benign prostatic hyperplasia
- Bladder cancer
- Bowel obstruction
- Colorectal cancer
- Constipation
- Fecal impaction
- Prostatitis
- Prostate cancer
- Spinal cord injury
- Urethral stricture

Discomfort
- Anal fissure
- Anorectal abscess
- Hemorrhoids
- Interstitial cystitis
- Pilonidal cyst
- Urolithiasis

Infections and Inflammation
- Crohn's disease
- Diarrhea
- Gastritis
- Gastroenteritis
- Glomerulonephritis
- Pyelonephritis
- Ulcerative colitis
- Urinary tract infection

Renal Failure
- Acute kidney injury
- Chronic kidney disease

Neoplasms
- Benign prostatic hyperplasia
- Bladder cancer
- Colorectal cancer
- Prostate cancer
- Renal cancer

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stones are associated with severe pain when they move down the ureter, into the bladder, and through the urethra (referred to as "passing the stone").[23] Hematuria is a common finding. If the stone becomes lodged in the ureter, a blockage can occur, leading to hydronephrosis and impaired kidney function.

Benign Prostatic Hyperplasia

Benign prostatic hyperplasia is an enlargement of the prostate gland commonly seen among older men. It is estimated that 30% of men age 60 years have moderate symptoms and 50% of men age 80 years or older have symptoms.[26] If untreated, the enlarging prostate, which surrounds the urethra at the base of the bladder, can obstruct urine flow, creating urinary retention. Common symptoms include frequency of urination, increased frequency of urinating at night, difficulty starting urinary flow, and a weak urinary stream. Chronic retention of urine can lead to UTI.

Urinary Tract Infection

UTI is caused by an infection in the urinary tract, representing the second most common bacterial infection in individuals. The symptoms associated with UTI include nausea and vomiting, chills, suprapubic or low back pain, bladder spasms, dysuria, burning with urination, frequency, urgency, hesitancy, or nocturia. UTIs are seen more frequently in pregnant women, females, and older men and women. These infections may cause sepsis and can result in death if not treated, especially in the elderly.[23]

Renal Failure

Renal failure occurs when there is a partially or complete cessation of kidney function. Renal failure can be acute or chronic. AKI is associated with a loss of renal function over a few days and can typically be reversed. CKD involves a process of renal failure that occurs over a long period of time. It is characterized by a gradual decrease in renal functioning and a gradual increase in metabolic waste. Regardless of the cause, untreated renal failure results in fluid overload, electrolyte imbalances, and metabolic acidosis, and ultimately leads to death.

Constipation

Constipation refers to difficulty passing stool and is usually associated with the passage of hard, dry stool; it can occur among individuals of any age. Constipation may be painful due to the bloating and flatus that may occur and also with trying to pass the stool itself. Chronic constipation may be caused by a lack of dietary fiber, certain medications (narcotic pain medications), chronic decreased intestinal peristalsis, or decreased fluid intake.[23]

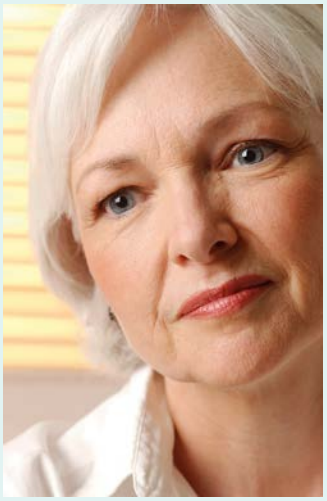
Diarrhea

Diarrhea is the frequent passing of watery, liquid, or loose stools and occurs among individuals across the lifespan. It can be acute or chronic. Acute diarrhea is usually associated with inflammation within the gastrointestinal tract due to a virus or bacteria and usually resolves in a few days. Chronic diarrhea persists for a longer period of time, such as several weeks. Because diarrhea is associated with the loss of water and electrolytes, dehydration and electrolyte imbalance may occur quickly, particularly among infants, children, and older adults.[23]

Colorectal Cancer

Colorectal cancer is the third leading cause of cancer in men and women in the United States, and caused an estimated 52,550 deaths in 2023.[27] Colorectal incidence and mortality rates are highest among African American men and women. Colorectal screening can prevent the development of cancer by removing precancerous colon polyps and has been credited with reducing the incidence and mortality during the past decade.

CASE STUDY



Case Presentation

Ms. Amanda Doyle is a 67-year-old White female with a history of type 1 diabetes and osteoarthritis in her left hip. Her diabetes is well controlled with diet and insulin. Although she takes ibuprofen to treat the arthritic pain, her mobility has declined, and she now uses a walker. Because of a past bad experience with anesthesia, she has been resistant to having hip replacement surgery and instead opted to increase the dosage of ibuprofen to 600 mg four times a day and just learn to live with the pain.

For the past 3 months, Ms. Doyle has experienced intermittent abdominal pain, cramping, and bloating with diarrhea. She also has had a reduced appetite and has frequently felt tired.

On several occasions she has experienced fecal incontinence because she was unable to get to the bathroom in time and was unable to "hold it." On two occasions, she experienced fecal incontinence in a public setting and was completely embarrassed by the situation. She is now afraid to leave the house because she fears it will happen again.

Ms. Doyle's daughter took her to her primary care provider who ordered several diagnostic tests. An occult blood test showed blood in her stool. A stool culture was done to rule out parasitic infections; this was negative. Because it had been 9 years since her last colonoscopy, a colonoscopy was ordered to rule out pathology within the colon such as ulcerations, inflammation, or tumors. The colonoscopy revealed inflammation to the lining of her colon. Her physician made the diagnosis of inflammatory bowel disease.

Case Analysis

1. In what way does the case exemplify the Concept of Elimination?
2. What risk factors for altered elimination (fecal incontinence) and inflammatory bowel disease does Ms. Doyle have?
3. How are the diagnostic tests described in the case consistent with what was described for assessment of elimination?

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CONCEPT 16

Perfusion

James Mark Tanner

Cells need a consistent blood supply to obtain oxygen and nutrients and to discard waste products. When the blood supply or perfusion is impaired, ischemia develops and can progress to necrosis, if prolonged. The purpose of this concept presentation is to help the nurse acquire an understanding about perfusion across the lifespan. Nurses should be able to promote an individual's healthy behaviors that optimize perfusion, identify individuals at risk of impaired perfusion, recognize when individuals are experiencing impaired perfusion, and respond with appropriate interventions.

DEFINITION

For the purpose of this concept presentation, perfusion refers to *the flow of blood through arteries and capillaries delivering nutrients and oxygen to cells.* Perfusion is a normal physiological process that requires the heart to generate sufficient cardiac output to transport blood through patent blood vessels for distribution in the tissues throughout the body. Thus, maintaining cardiovascular health is essential to optimal perfusion.

SCOPE

The concept of perfusion and problems associated with impaired perfusion represents a wide range of physiological processes and conditions. The scope of perfusion ranges from optimal perfusion to no perfusion (Fig. 16.1). Variations in perfusion are seen among individuals across the lifespan with multiple causative factors and a wide range of effects and duration. Changes in perfusion can be temporary, long term, or permanent. Disorders that lead to changes in perfusion include acute conditions (such as myocardial infarction, stroke, or shock), chronic disorders (such as hypertension and heart failure), and acute exacerbations of chronic conditions, which represent a marked change in the individual's baseline. Impaired perfusion is closely associated with neurologic (impaired blood flow within the brain), pulmonary (impaired blood flow to and from the lungs), and cardiovascular (impaired blood flow in heart, arteries, and veins) conditions.

NORMAL PHYSIOLOGIC PROCESS

The cardiovascular system is responsible for the perfusion of blood throughout the body. It is made up of the heart, which serves as the pump for the system; the arteries, which deliver blood to the tissue; the capillaries where oxygen and nutrient exchange can take place; and the veins which return blood to the heart. The cardiovascular system also interacts with the respiratory system as part of the perfusion process. Deoxygenated blood flows to the lungs where oxygen diffuses into the blood within the alveoli; the oxygen attaches to hemoglobin in the red blood cells and is transported to the cells. Concept 18, Gas Exchange details this process further.

From a conceptual lens, the process of perfusion can be thought of in two general categories: central perfusion and tissue perfusion. The normal physiological process of perfusion is presented from this perspective.

Central Perfusion

The term *central perfusion* refers to the action of the heart and large vessels to deliver oxygenated blood to the body organs and tissues. It is driven by cardiac output, which is the outcome of coordinated effects of electrical and mechanical factors that move blood through the heart into the peripheral vessels.

In very simple terms, the heart is a pump composed of cardiac muscle tissue with four chambers (a pair of atrial chambers and a pair of ventricular chambers) and four valves. The right atrium receives deoxygenated blood from the venous system through the superior and inferior vena cava. Blood then flows to the right ventricle where it is pumped to the lungs, allowing deoxygenated blood to participate in gas exchange and become oxygenated. Oxygen-rich blood then flows to the left atrium and into the left ventricle where it is pumped out through the aorta and sent to the rest of the body. Several principles associated with central perfusion include cardiac conduction, cardiac cycle, and cardiac output.

Conduction

The pumping action of the heart relies on electrical impulses. Cardiac muscle is unique in that it can generate its own electrical

Fig. 16.1 Scope of Concept: Perfusion.

impulses. These impulses travel through cardiac tissue and trigger contraction of the muscle, resulting in the pumping action of the heart needed to perfuse the blood throughout the body. Electrical conduction of the heart originates in the sinoatrial (SA) node (located in the upper right atrium) and triggers the contraction of both atria. The signal then travels to the atrioventricular (AV) node where the signal is delayed slightly (to allow for the contraction of the atria) and then sends the impulse through a series of branches (bundle of His) and Purkinje fibers in the myocardium, leading to the contraction of the ventricles.

Cardiac Cycle

The *cardiac cycle* refers to electrical and mechanical actions that occur with each heartbeat. The phase of the cardiac cycle during which the ventricles contract is called *systole*. As the ventricles contract, they create pressure that closes the mitral and tricuspid valves, preventing the backflow of blood into the atria. This ventricular pressure forces the aortic and pulmonic valves to open, resulting in ejection of blood into the aorta (from the left ventricle) and the pulmonary arteries (from the right ventricle). As blood is ejected, the ventricular pressure decreases, causing the aortic and pulmonic valves to close. The ventricles relax to fill with blood. The movement of blood from the atria to the ventricles is accomplished when the pressure of the blood in the atria becomes higher than the pressure in the ventricles. The higher atrial pressures passively open the mitral and tricuspid valves, allowing blood to fill the ventricles. The phase of the cardiac cycle when ventricles fill with blood is called *diastole*. Fig. 16.2 shows the flow of blood through the right and left sides of the heart.

Cardiac Output

Cardiac output is defined as the amount of blood pumped by the heart each minute. Normal cardiac output ranges from 4 to 6 L/min in an adult. Two variables that influence cardiac output are *stroke volume* (SV) and *heart rate* (HR) and is calculated as SV x HR.

Stroke volume is the amount of blood ejected from each ventricle during contraction and is affected by preload, contractility, and afterload.

- *Preload* is the force that stretches heart muscle before it contracts; this is attributed to the amount of blood in the ventricles at the end of diastole.
- *Contractility* refers to the strength of myocardial contraction and is influenced by preload. The greater the preload, the greater the stretch of the myocardium, and, thus, the greater the strength of the contraction. In a healthy heart, contractility increases with extra demand, for example, during exercise.
- *Afterload* is the force that ventricles must exert to open the semilunar valves (aortic and pulmonic). It is influenced by resistance to the ejected blood created by the diameter of blood vessels receiving the blood, also called *systemic vascular resistance* (SVR). The smaller or more constricted the blood vessels, the greater the pressure required to open the semilunar valves to eject the blood thereby increasing the workload of the heart. Alternatively, the larger or more dilated the blood vessels, the less pressure required to eject blood; thereby reducing the workload on the heart.

Heart rate is the number of cardiac contractions per minute and is influenced by factors such as age, fitness level, and the autonomic nervous system. The sympathetic nervous system increases heart rate, whereas the parasympathetic nervous system decreases it. Heart rate can also be influenced by the metabolic demands of the body. It will increase when metabolic demands are higher and decrease when they are lower.

Tissue Perfusion

Tissue perfusion refers to the blood that flows through arteries and capillaries to target tissues. Arterial blood pressure is determined by the cardiac output and SVR. Ventricular contraction creates a pressure, which pushes blood through arteries, into capillaries, and into the interstitial spaces allowing delivery of oxygen, fluid, and nutrients to cells. The tough and tensile arteries and their smaller branches, the arterioles, are subjected to remarkable pressure from the cardiac output and made to withstand it. They maintain blood pressure by constricting or dilating in response to stimuli. Blood is returned to the heart through veins and their smaller branches, the venules. These vessels are less sturdy but more expansible, enabling them to act as a reservoir for extra blood, if needed to decrease the workload of the heart. Pressure within veins is low compared with that within arteries. One-way valves in each vein keep blood flowing toward the heart.

Age-Related Differences

Infants and Adolescents

In infancy, the size of the heart in relation to the total body size is larger. The systolic blood pressure after birth is low because the left ventricle of the neonate is weaker. The left side of the

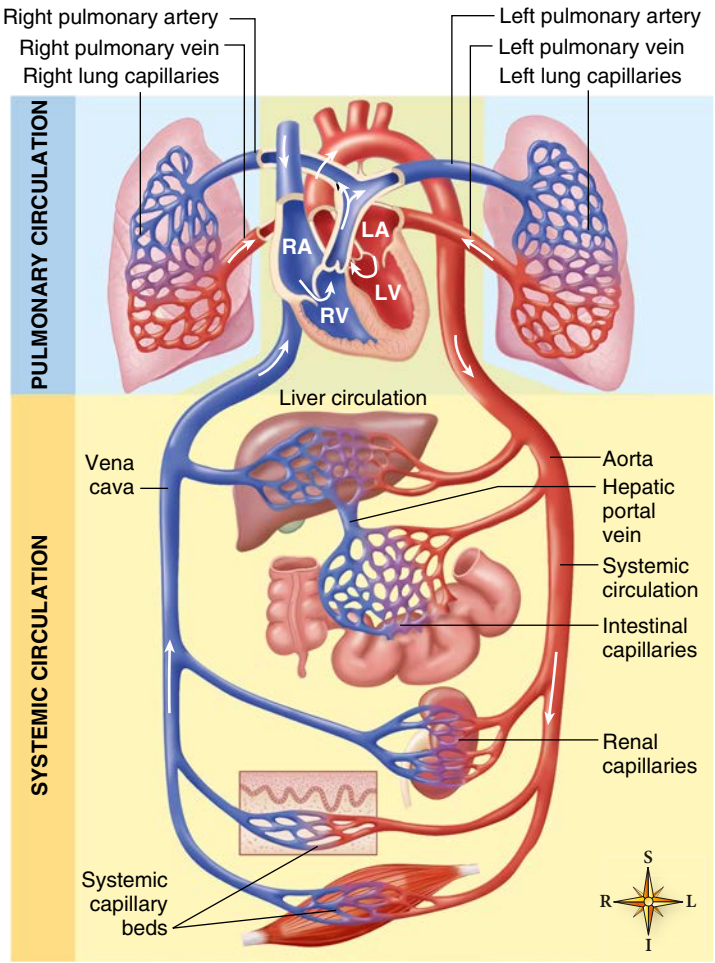

Fig. 16.2 Circulatory Routes. The pulmonary circulation routes blood flow to and from the gas exchange tissues of the lungs. The systemic circulation, on the other hand, routes blood flow to and from the oxygen-consuming tissues of the body. *I*, inferior; *L*, left; *LA*, left atrium; *LV*, left ventricle; *R*, right; *RA*, right atrium; *RV*, right ventricle; *S*, superior. (From Patton, K. T., & Thibodeau, G. A. (2016). *Anatomy & physiology* (9th ed.). St. Louis: Mosby.)

heart develops strength and the systolic pressure rises rather sharply during the first 6 weeks.

Throughout childhood, heart rate declines, and blood pressure rises, which is attributed to rapid growth. An increase in heart size occurs during the adolescent growth spurt, with an accompanying increase in blood pressure and decrease in heart rate. Soon after puberty, the systolic pressure rises to adult levels. Arteries and veins lengthen to keep pace with growth.[1] Cardiac output also increases throughout childhood and peaks during adolescence. Oxygen consumption is maximized during this time of life as a result of rapid physical growth and activity.[2]

Older Adults

The most relevant age-related changes are stiffening and thickening of the myocardial tissue and decreased elasticity of arterial walls. Heart valves tend to calcify and become fibrotic. Collectively these changes lead to reduced cardiac efficiency (decreased stroke volume and cardiac output) during exercise and with other factors contributing to increased oxygen demand. Arterial stiffening contributes to an increase in blood pressure. A decrease in blood pressure upon standing (orthostatic hypotension) may contribute to falls. The valves in the veins become less efficient, contributing to lower extremity edema.[3]

VARIATIONS AND CONTEXT

The two broad categories used to describe the normal physiological process of perfusion are also used to describe problems associated with perfusion: impaired central perfusion (mechanisms for blood delivery) and impaired tissue perfusion (amount of blood available to target tissues).

Impaired Central Perfusion

Many conditions are associated with impaired central perfusion; if compensatory mechanisms are ineffective, decreased cardiac output occurs. In general, the conditions leading to reduced cardiac output fall into one of five groups: altered conduction, reduced myocardial contraction, ineffective heart valves, intravascular volume, and SVR. Although these are presented separately, many of these may occur simultaneously or as a result of another.

Altered Conduction

Altered impulse conduction through the heart (from the sinoatrial [SA] node through the atrioventricular [AV] node to the right and left bundle branches and Purkinje fibers) interrupts the electrical function necessary for effective contractions. An abnormal electrical impulse is referred to as a cardiac dysrhythmia (also known as arrythmia). There are multiple types of dysrhythmias, ranging in severity from benign to serious. Serious dysrhythmias cause a reduction of cardiac output, thus constituting a medical emergency; some dysrhythmias (such as ventricular fibrillation) cause sudden death.

Reduced Myocardial Contraction

Myocardial contraction refers to the contraction of the heart. When myocardial contraction is decreased or weaker than normal, cardiac output can be reduced. Changes in myocardial conduction, congenital defects, myocardial ischemia or infarction, inflammation or infection of the heart muscle or pericardial sac, or other structural abnormalities can all cause decreased myocardial contraction.

Ineffective Heart Valves

The four heart valves play an important role in ensuring normal flow of blood through the heart and great vessels. Malfunction of one or more of the heart valves can reduce cardiac output by increasing pressure in each chamber, which then reduces the pumping efficiency of the heart. The major categories of problems with heart valves include regurgitation (when valves do not close properly, allowing blood to flow backward through the heart), stenosis (when valves do not open completely, causing a narrowed opening and interference with blood flow), and congenital valve defects.

Intravascular Volume

The intravascular volume affects preload. Low intravascular volume (hypovolemia) can result in less blood volume being available to maintain a proper cardiac output. Baroreceptors detect reduced intravascular pressure and trigger compensatory mechanisms (vasoconstriction, increased heart rate, and antidiuretic hormone release). In severe cases, hypovolemic shock, caused by hemorrhage, dehydration, or third space fluid loss, can occur. Increased intravascular volume (hypervolemia) is associated with excess fluid and is often caused by heart failure, renal failure, and liver failure. When severe, hypervolemia can overwhelm the heart and cause it to become less efficient, resulting in reduced cardiac output.

Systemic Vascular Resistance

As described, SVR refers to the pressure resistance created within the vascular system. A sustained increase or decrease in SVR can affect cardiac output. Increased SVR can be attributed to vasoconstriction, atherosclerosis (a buildup of plaque and other substances within the arteries), arterial stenosis, or increased viscosity of the blood. Increased SVR requires that the heart compensate by increasing the contractile force and/or increasing heart rate to maintain adequate cardiac output. Likewise, cardiac output is affected by a reduction in SVR, attributed to vasodilation of the arteries or rapid and significant blood loss (hemorrhage).

Impaired Local/Tissue Perfusion

Interference with tissue perfusion reduces blood flow through capillaries, reducing delivery of oxygen, fluid, and nutrients to cells. Different organs and tissues require different volumes of blood to maintain adequate function. As an example, some organs, such as the brain and intestines, require larger volumes of blood compared with skeletal tissue. Inadequate tissue perfusion throughout the body occurs when there is a significant reduction of central perfusion.

Localized impairment of tissue perfusion is often associated with the occlusion or constriction of an artery, which interferes with blood flow to tissues supplied by the affected artery. In such situations, the impairment is limited to a specific area. A classic example is the blockage of a cerebral artery by a thrombus that stops blood flow to part of the brain (leading to a stroke). Similarly, narrowing or blockage of a coronary artery reduces or stops blood flow to part of the myocardium (leading to angina or acute myocardial infarction).

Impaired tissue perfusion can also result from mechanisms within the tissue or organ. As an example, excessive edema in the lower extremities can interfere with cellular oxygen exchange, thus creating reduced tissue perfusion. Likewise, a thrombus in a vein can interfere with blood flow back to the heart, leading to edema and inflammation in the surrounding tissues

PHYSIOLOGIC CONSEQUENCES

In the preceding sections, impaired perfusion was presented from the perspective of central perfusion and tissue/local perfusion. Regardless of the underlying cause of impaired perfusion (central or localized), the consequence at the cellular level is the same for the area(s) affected. Cells must have a steady supply of oxygen and nutrients for survival. A reduction and/or interruption of oxygenated blood flow can have devasting effects to the cells.

Hypoxia (lowered oxygenation to cells) and anoxia (absence of oxygenation to cells) highlight the interrelationship between the cardiovascular and respiratory systems because cells can become deprived of oxygen from the lack of blood flow, from the lack of oxygen within the blood, or both. Ischemia is a *reversible* cellular injury that occurs when the demand for oxygen exceeds the supply because of a reduction or cessation of blood flow (hypoxia). When ischemia is prolonged, it may result in a lack of oxygen (anoxia) to tissues, followed by irreversible cellular injury, necrosis, and death of the tissues affected.

The extent of potential harm is directly related to the cause and length of time of the impairment. Although the consequences of impaired tissue perfusion are generally more localized, far-reaching systemic consequences can occur. Depending on the area and size of the tissues affected, impaired perfusion involving an organ can have severe consequences, including organ failure. Extensive impairment of central perfusion results in a large-scale, systemic impairment, affects all major multiple organs, and can lead to cardiovascular collapse if compensation mechanisms are unsuccessful. Such scenarios are often fatal.

Physiological consequences of impaired perfusion can also represent a cascade of events that exacerbate impaired perfusion. As an example, myocardial infarction (cell death) causes permanent damage to the affected areas of the myocardium. When the damage to the heart is significant, normal conductivity or contractility may be affected, leading to reduced cardiac output associated with heart failure. In this case the consequence of a localized tissue perfusion, led to impaired central perfusion as a result of organ failure. As another example, peripheral artery disease is associated with impaired blood flow to the extremities. Consequences may include pain, poor wound healing, infection, and necrosis of involved tissues (such as a toe or foot) and could result in amputation.

RISK FACTORS

Adequate perfusion is required for life; therefore, all individuals, regardless of age, sex, race, or socioeconomic status, are potentially at risk for impaired perfusion. Some risk factors are modifiable through lifestyle behaviors, whereas others are not. Nurses need to recognize populations and individuals at risk so that changes can be made to reduce that risk.

Populations at Risk

Older Adults

Older adults have many risk factors for impaired perfusion. Coronary artery blood flow, stroke volume, and cardiac output decrease, increasing the risk for heart failure. Stiffening and thickening of the heart tissues decreases the ability to respond to the need for increased circulation and prolongs the time needed for the heart to return to a resting state after stress. Decreased elasticity of arteries limits the consistent forward movement of blood to organs. The valves in veins become less efficient, contributing to peripheral edema, and the sluggishness of blood flow contributes to deep vein thrombosis.[3]

Social and Environmental Factors

Low family income and low education level are contributing factors to adverse cardiovascular disease outcomes. Social and psychological factors such as access to health care, medical compliance, eating habits, depression, and stress are thought to play a role in this relationship.[4]

Individual Risk Factors

A number of individual risk factors are associated with perfusion. Table 16.1 presents some of the most common modifiable and unmodifiable risk factors; some of these are subsequently described in more detail.

Genetics

Although the focus on risk reduction for cardiovascular disease has traditionally centered around management of lifestyle factors, genetic risk factors appear to predispose individuals to cardiovascular disease as well. The risk for illness is even greater when unhealthy lifestyle habits are combined in individuals with genetic risk factors. A few examples are presented here.

Genetics is thought to play some role in hypertension.[5] African American individuals tend to develop hypertension more often than people of any other racial background in the United States. It often is more severe in this group, and some medications are less effective.[3]

Familial hypercholesterolemia, a defect that does not allow the body to remove low-density lipoproteins, contributes to atherosclerosis characterized by plaques of cholesterol and other lipids that line the inner layers of arteries, obstructing blood flow.[6] Other conditions are thought to have inherited risk include coronary artery disease, heart failure, diabetes, and certain arrhythmias. Hemoglobinopathies are inherited blood disorders resulting in abnormal hemoglobin, such as sickle cell disease. In this disorder, the abnormal hemoglobin clumps together and occludes blood vessels when the person experiences hypoxia, dehydration, or acidosis.[7]

TABLE 16.1 Individual Risk Factors for Impaired Perfusion

Modifiable risk factors	Unmodifiable risk factors
• Smoking: nicotine vasoconstricts • Elevated serum lipids: contribute to atherosclerosis • Sedentary lifestyle: contributes to obesity • Obesity: increases risk for type 2 diabetes and atherosclerosis • Diabetes: increases risk of atherosclerosis • Hypertension: increases work of myocardium	• Age: increases with age • Gender: men > women • Genetics: family history

Adapted from Wilson, S., & Giddens, J. (2022). *Health assessment for nursing practice* (7th ed.). St. Louis: Elsevier.

Lifestyle

A number of risk factors are associated with lifestyle choices—and these may exacerbate disease among those who have genetic predisposition to cardiovascular disease. Among the most important risk factors include smoking, inactivity, an unhealthy diet, and obesity. These lifestyle factors are known to increase risk of hypertension, obesity, heart disease, and type 2 diabetes, which all impair perfusion.[8]

Immobility

Individuals who are immobile are at risk for impaired tissue perfusion. This includes those who are paralyzed, are unconscious or have an impaired cognitive state, or are on bed rest to recover from an illness, injury, or surgery. Sitting in one position for a prolonged time can interrupt blood flow of the legs. Perfusion impaired by immobility can cause two problems: pressure ulcers and venous thrombi. When individuals remain in one position for a prolonged time, their perfusion is impaired by the external pressure on the dependent areas. If the prolonged pressure exceeds the capillary pressure, then ischemia occurs resulting in anoxia and necrosis causing skin breakdown.[9-10.] Being immobile also contributes to blood clot formation by slowing the return of venous blood to the heart. Slow blood flow results in stasis, a risk factor for thrombi formation. Individuals who are confined to a sitting position for long periods (e.g., long airplane flights) are susceptible to formation of venous clots.

ASSESSMENT

Assessment of perfusion includes obtaining a history, conducting a physical examination, and analyzing results of diagnostic tests.

History

Baseline History

When collecting subjective data, nurses ask patients about their present health status, past health history, family history, and personal and psychosocial history.

Present health status includes questions about chronic diseases, such as diabetes, renal failure, hypertension, or hemophilia. Nurses ask patients for a list of medications they take, both prescription and over-the-counter, including the reason for each medication and its effectiveness. Patients are asked about their use of recreational or street drugs such as cocaine, because it is associated with myocardial infarction and stroke.

Past health history includes questions about heart disease, heart defects, rheumatic fever, or sickle cell disease. Data are collected about family members with cardiovascular and clotting disorders.

Personal and psychosocial history includes diet, exercise, smoking, and alcohol consumption. A diet high in fat and carbohydrates together with minimal or infrequent exercise contributes to atherosclerosis and obesity. The patient is asked about the kind of exercise and how often it is performed and for what length of time, because exercise increases blood flow. Information about smoking habits is important, because nicotine causes vasoconstriction and is a toxin that damages the endothelium, contributing to atherosclerosis. Excessive alcohol intake is associated with dysrhythmias.[11]

A health history of an infant should include data about feeding problems and weight gain. Feeding difficulties accompanied by fatigue, rapid breathing, sweating with feeding, and poor weight gain are common symptoms in infants with heart disease.[1] Respiratory infections, breathing problems, and onset and frequency of skin tone changes, especially cyanosis, should be noted. For older children and adolescents, a history should include questions about exercise tolerance, edema and respiratory problems, chest pain, palpitations, fainting, and headaches.[1]

Problem-Based History

When providing their history, patients may describe pain, fainting (syncope), dizziness, shortness of breath (dyspnea), swelling (edema), bleeding, or fatigue. When these symptoms are reported, the nurse follows up with a symptom analysis to obtain additional data, including the onset of the symptom; the location, duration, and severity of the symptom; a description of the symptom; factors that alleviate or aggravate the symptom; other associated symptoms; and actions taken by the patient to relieve the symptom.[11]

Pain. A common symptom reported by patients with impaired tissue perfusion is pain. When there is inadequate perfusion to carry oxygen needed to meet tissue needs, patients experience ischemic pain. This type of pain occurs by the same process, whether it is occurring in coronary arteries affecting central perfusion or in peripheral arteries affecting tissue perfusion.

Chest pain may be because of impaired blood flow to the myocardium. Inadequate blood flow to the heart, or myocardial ischemia, often results in chest pain, also known as angina. There are several mechanisms that can cause myocardial ischemia. Stable angina, occurs when there is an increased demand for oxygen on the heart. Individuals often report a precipitating event, such as physical exertion, exposure to cold temperatures, or emotional stress. Patients with stable angina often describe their chest pain as a constricting or squeezing sensation that is relieved with rest and/or by taking one or more nitroglycerin tablets (a vasodilator) as both of these interventions reduce myocardial oxygen demand. By contrast, patients with acute coronary syndrome (unstable angina advancing to myocardial infarction) report severe chest pain that is not precipitated by exertion, stress, or other factors and is not relieved by rest or nitroglycerin. Symptoms of unstable angina often include shortness of breath, radiating pain to the jaw or arms, nausea, vomiting, dizziness, and diaphoresis. Although men and women may experience similar symptoms, some women have had acute myocardial infarction with no chest pain; instead they may report shortness of breath, dizziness, and neck, jaw, shoulder, upper back, or abdominal discomfort.[12]

Another possible cause of chest pain is a pulmonary embolism. Pulmonary embolism causes chest pain by blocking the pulmonary arteries with emboli that travel through the venous system from a distal part of the body, often from the legs. The chest pain is often worse when breathing deeply (pleurisy), coughing, bending, or stooping. The pain becomes worse with exertion and is not relieved by rest. Related symptoms may include cyanosis, fever, irregular heart rate, and dizziness.[13]

Pain in the legs attributable to impaired tissue perfusion may be caused by peripheral arterial disease or a deep vein thrombus. Peripheral arterial disease develops from atherosclerosis that causes vessel occlusion. Signs and symptoms vary depending on the number and location of arteries affected, degree of impairment, presence of collateral circulation, and the patient's activity level. Patients may report pain when walking that is relieved with rest, called intermittent claudication. This pain indicates an inadequate blood supply to transport oxygen needed to meet the demands of the leg muscles during exertion. This explains why the pain stops when the increased demand of oxygen from walking stops. As the arterial occlusion increases, patients may report "rest pain," which is leg pain while walking that is not relieved with rest.[14] By contrast, deep vein thrombosis occurs when a blood clot (thrombus) forms in one or more deep veins, usually in the legs, that occludes the vein thereby impairing the blood return to the heart. The pain is described as soreness or cramping.[15]

Syncope. Syncope is the transient loss of consciousness because of inadequate cerebral perfusion. Nurses ask about symptoms experienced before the syncope to help determine the cause. For example, reports of headache, numbness, and

confusion may indicate a stroke caused by cerebral emboli. Slowing of the pulse may suggest a cardiac rhythm disorder. Reports of ringing in the ears may indicate an inner ear problem.[11]

Dizziness. Patients may report feeling dizzy. Using a symptom analysis, nurses collect data to learn when lightheadedness occurs and about aggravating and alleviating factors. If the dizziness occurs when the patient sits up suddenly, it is called *orthostatic hypotension,* which is defined as a 20- to 30-mm Hg drop in systolic blood pressure when a patient moves from a lying to a sitting or standing position. Nurses inquire about the duration of the dizziness. For many patients, the dizziness subsides if they sit for a few seconds before standing. In contrast, dizziness unrelated to position changes may be caused by inadequate blood flow to the brain. There may be inadequate intravascular volume, hypotension, a physiological issue with the pumping mechanism of the heart, or an obstruction of the carotid arteries. Each of these issues reduces blood flow to the brain and, therefore, could result in a syncopal episode.[11]

Dyspnea. Inadequate circulation of blood can cause patients to be dyspneic or short of breath during activity. This symptom may be reported by patients with primary perfusion problems, such as heart failure, or by those with primary gas exchange problems, such as chronic obstructive pulmonary disease. In the case of heart failure, an inadequate ability to pump blood out of the heart because of a weakened pumping mechanism results increased pressure from the left side of the heart, causing pulmonary edema. This pulmonary edema interferes with the normal diffusion of oxygen and causes the individual to become tachypneic to compensate for the altered diffusion of gas. Patients may report having to sleep sitting up or using several pillows to prop themselves up during the night. Lightheadedness may be reported, attributable to inadequate oxygen transport to the brain. Nurses inquire about the duration of patients' shortness of breath and if the dyspnea occurs on inhalation, exhalation, or both. As this condition continues to get worse, it can start to cause right-sided heart failure as well, which will manifest with peripheral edema and other symptoms.[11] When an infant is being evaluated for heart disease, the mother or caretaker may report that the infant needs to stop sucking "to catch his or her breath" or that the infant exhibits a bluish color around the lips when sucking.[16]

Edema. Patients may report that their socks leave indentations around their legs or edema in their feet that is worse at the end of the day. This edema reflects excessive fluid in the interstitial spaces, which indicates a fluid overload or an accumulation of fluids; a related symptom is weight gain. When present in both legs, edema may be caused by fluid overload from diseases (e.g., heart failure, renal failure, or liver disease). The excessive fluid may occur from renal disease when blood cannot be filtered by the kidneys. Right-sided heart failure is another cause of peripheral edema that develops if the right ventricle is unable to eject its usual volume of blood. The most common cause of right-sided heart failure is left-sided heart failure. A backup of blood occurs from the right ventricle into the right atrium and then into the inferior and superior venae cavae. Because of the buildup of blood, the veins are unable to transport blood back to the heart, resulting in an accumulation of blood in the venous system that pushes fluid into the interstitial spaces, causing edema.[11] Unilateral edema of an extremity may be lymphedema caused by occlusion of lymph channels (e.g., elephantiasis or trauma) or surgical removal of lymph channels (e.g., after mastectomy). Localized edema of one leg may be caused by venous insufficiency from varicosities or deep vein thrombosis.

Fatigue. Fatigue is another common symptom associated with impaired perfusion. Patients may report feeling more tired than usual or having a lack of energy. Nurses ask whether the onset was gradual or sudden, at what time of day onset occurred, and about the duration. Fatigue experienced during daily activities such as shopping or climbing stairs occurs because the heart cannot pump enough blood to meet the body tissue needs. Both right-sided and left-sided heart failure cause a gradual onset, whereas acute blood loss produces fatigue more rapidly. Anemia causing fatigue may occur in patients with heart failure as a result of impaired nutritional intake caused by dyspnea during meals, renal disease resulting from reduced blood flow to kidneys, or adverse effects from medications such as from taking angiotensin-converting enzyme inhibitors (e.g., enalapril). Fatigue from anemia lasts all day.[11]

Examination Findings

Physical assessment is performed by measuring vital signs, including oxygen saturation, and by using the examination techniques of inspection, palpation, and auscultation.

Vital Signs

When measuring blood pressure and peripheral pulses, nurses may notice changes such as hypotension or hypertension, bradycardia, or tachycardia. For example, severe bleeding may result in hypotension and tachycardia. The pulse rhythm may be irregular when conduction problems are present. When assessing for orthostatic hypotension, blood pressure is measured with the patient in three positions: lying, sitting, and standing. Nurses compare these three blood pressure readings to confirm that position change is a contributing factor to dizziness or fainting.

Peripheral pulse rates should be equal bilaterally. In adults, the respiratory rate may be increased, and breathing may be labored, with a low oxygen saturation when perfusion is inadequate to provide oxygenated blood to cells. A child's pulse rate may normally increase on inspiration and decrease on expiration. Congenital heart disease in infants produces elevations in heart and respiratory rates when feeding.[11]

Inspection

Inspect the overall skin tone and for evidence of skin discoloration.[11] Pale skin may indicate anemia. If tissue is not being perfused well, it will also typically be cold and clammy.

Inspect the anterior chest and neck. A marked retraction on the chest near the apical space may indicate pericardial disease or right ventricular hypertrophy. Jugular vein pulsations are an expected finding; however, fluttering or prominent pulsations may indicate right-sided heart failure.

Inspect the upper and lower extremities for symmetry, skin integrity, and color. Arms and legs should be symmetric with

skin intact and color uniform and appropriate for race. If one arm or leg appears larger than the other, measure the circumference of each arm or leg and compare. Lymphedema may cause one arm to be larger. Venous thrombi may cause redness and an increased circumference of the extremity from edema. Skin ulcerations may indicate arterial or venous perfusion abnormalities. Patients with arterial occlusion may have pallor and lack of hair on the legs.

Palpation

Chest palpation. The chest is palpated as part of an assessment of the cardiovascular system. Palpate the apical pulse (the apex of the heart) at the fifth intercostal space, midclavicular line to assess the point of maximal impulse. An expected finding is that the apical pulse is palpable at the fifth intercostal space and midclavicular line and with a regular rhythm. An enlarged heart may cause the point of maximal impulse to shift laterally. Continue to palpate over the precordium. Note the presence of a prominent pulsation. A slight thrust during systole called a *lift* whereas a more prominent thrust during systole is called a *heave.* Lifts and heaves may occur from left or right ventricular hypertrophy due an increased workload.[11] Another abnormal finding is a vibration that is palpated over the precordium; this is usually associated with turbulent blood flow through the valves (and often associated with a loud murmur).

Palpation of the extremities. Palpate upper and lower extremities for skin turgor, temperature (using the back of the hands), capillary refill, and peripheral pulses. Skin turgor should be elastic, temperature should be warm, capillary refill of fingers and toes should be less than 2 seconds, and pulses (brachial, radial, posterior tibial and dorsalis pedis) should be 2+ strength and regular rhythm. If the skin does not immediately fall back into place after palpation, it is termed *tenting* and indicates there is reduced fluid in the interstitial space from a fluid volume deficit. By contrast, when the indentation of the nurse's thumb or finger remains in the skin, it is termed *pitting edema* indicating increased fluid in the interstitial spaces. Skin temperature may feel cool, called *poikilothermia,* because of impaired arterial perfusion. Capillary refill greater than 2 seconds indicates poor perfusion.

The strength of the pulse, also called the *amplitude,* is an indication of perfusion. Absence of a pulse is indicated as 0; a diminished or barely palpable pulse is 1+, indicating poor perfusion or fluid/blood loss; a full or strong pulse is 3+, indicating fluid excess; and a bounding pulse is 4+, indicating fluid overload.[11] When irregular pulses are palpated, notice whether the irregularity has a rhythm. A regular irregularity is felt when patients have premature atrial contractions—for example, an extra beat after every third beat. An irregular irregularity is felt in patients who have atrial fibrillation when no pattern is noted in the irregularity. Also assess for a pulse deficit, which is characterized as an apical pulse rate that is faster than the radial pulse rate. Specifically, pulse deficit is calculated by subtracting the radial rate from the apical rate. This deficit should be 0 (zero), meaning the rates are equal. Pulse deficits occur when patients have dysrhythmias such as atrial fibrillation.

Lower extremity pain, paresthesia, and weak or absent dorsalis pedis and posterior tibial pulses are indications of arterial occlusion. When this is suspected, the nurse calculates the ankle-brachial index by dividing the ankle systolic blood pressure by the brachial systolic blood pressure. Those with peripheral arterial disease have an ankle-brachial index less than the minimum normal value of 1.0 . By contrast, venous occlusion is indicated when leg pain is accompanied by redness and edema.[11]

Auscultation

Auscultation of the patient's heart may reveal S_1 and S_2 heart sounds, as expected, and abnormal heart sounds such as S_3, S_4, and murmurs. The S_3 sound is heard in early diastole and may be as a result of left ventricular failure, volume overload, or regurgitation of the mitral, aortic, or tricuspid valves. The S_4 sound is heard in late diastole and may be as a result of resistance to ventricular filling from hypertension, ventricular hypertrophy, aortic stenosis, or coronary artery disease. Murmurs create a blowing sound that indicates there is turbulent blood flow through the heart. When a patient has a history of atherosclerosis or reports dizziness, the nurse auscultates the carotid artery for bruits.[11]

When auscultating the heart of an infant and child, the nurse uses a pediatric stethoscope. A venous hum heard over the jugular vein caused by turbulent blood flow is considered a normal variation in children. Characteristic heart murmurs are heard in infants with congenital heart disorders such as atrial septal defect, ventricular septal defect, and patent ductus arteriosus. Infants with coarctation of the aorta have high blood pressure and bounding pulses in the upper extremities, but lower blood pressure, weak to absent pulses, and cool lower extremities.[1]

Diagnostic Tests

Laboratory Tests

Cardiac enzymes/markers. Enzymes released from damaged cells circulate in the blood and can be measured to confirm a number of cardiovascular conditions.

- Creatine kinase (CK) is an enzyme that is present in myocardium (CK-MB), in muscle (CK-MM), and in brain (CK-BB) tissues. When enzymes are isolated, the level of CK-MB is elevated 3 to 6 hours after a myocardial infarction.[17]
- Cardiac troponins are myocardial muscle proteins released after myocardial injury. Testing for these proteins is important because they have a high specificity for cardiac damage. This test is used to evaluate patients with suspected acute coronary syndromes and predict the likelihood of future cardiac events. Cardiac troponin levels become elevated sooner and remain elevated longer than CK-MB, but will typically elevate after CK and myoglobin.[17]
- Myoglobin is an oxygen-binding protein found in cardiac and skeletal muscles. Increased myoglobin levels indicating cardiac injury or death occur about 3 hours after infarction.[17]
- Homocysteine (Hcy) is an amino acid. Evidence suggests that elevated levels of Hcy may act as an independent risk factor for ischemic heart disease, cerebrovascular disease, peripheral arterial disease, and venous thrombosis.[17]
- C-reactive protein (CRP) is produced by the liver during acute inflammation. The level of CRP correlates with the peak levels of the CK-MB, but CRP peaks occur 1 to 3 days

earlier. Failure of CRP to normalize may indicate ongoing damage to the heart.[17]

Serum lipids. Serum lipids are measured to detect hyperlipidemia and include cholesterol lipoproteins (low-density lipoproteins[LDLs], high-density lipoproteins [HDLs], very low-density lipoproteins [VLDs]), and triglycerides. Lipoproteins are an accurate predictor of heart disease. High levels of LDL adhere to the endothelium, obstructing blood flow. The function of HDL is to remove lipids from the endothelium to provide a protective effect against heart disease.[17]

Complete blood count. Elements of the complete blood count provide information regarding the oxygen-carrying capacity of the blood and the risk of clotting. Specifically, the number of red blood cells (RBCs), the hemoglobin level, and hematocrit level are used to diagnose polycythemia and anemia and to determine hydration. Patients with polycythemia have elevated levels of erythrocytes or RBCs, which increases the risk of clotting. Patients may develop anemia as a result of blood loss, which is indicated by RBC, hemoglobin , and hematocrit values that are lower than normal.[17]

B-type natriuretic peptide. B-type natriuretic peptide is a hormone produced by the heart. It is released from the ventricles whenever there is a state of volume and pressure overload. This test can be used to help differentiate between cardiac and pulmonary origins of dyspnea.[18]

Electrocardiogram

An electrocardiogram (ECG) is performed by placing 12 leads on the patient's chest and extremities to record the electrical impulses through the heart. The waveforms generated detect cardiac dysrhythmias by documenting on a screen or paper the electrical impulses generated by the heart during contraction and relaxation of atria and ventricles. A 12-lead ECG can be used to detect myocardial ischemia or infarction when patients complain of chest pain. It can also be used to identify electrical abnormalities in the heart and for other diagnostic purposes. Continuous cardiac monitoring can be used to continuously monitor the heart rhythm using one or more leads.[17]

Cardiac Stress Test

A cardiac stress test is used to detect issues with cardiac perfusion in the presence of a stressor. It is usually indicated for individuals with symptoms (chest pain with activity or unexplained shortness of breath) or significant risk factors. Two types of stress tests include an exercise stress test and pharmacologic stress test.[19]

Exercise cardiac stress test. The exercise cardiac stress test is one of the most common cardiac stress tests because it is relatively simple and noninvasive. The patient exercises on a treadmill with a progressive increase in speed and elevation or pedals a stationary bike to increase heart rate and workload. During the test, an ECG is recorded along with regular monitoring of heart rate and rhythm, blood pressure, and respiratory rate.[17] If coronary artery disease is present, changes in electrical conduction or other symptoms, such as chest pain, may occur.

Pharmacologic stress test. Another common cardiac stress test involves the administration of certain pharmacologic agents that stimulate the physiological effects of exercise such as dilating the coronary arteries. This is often done when patients are unable to perform the exercise stress test because of underlying conditions or when a treadmill or stationary bike is not available. Agents often administered include dobutamine and adenosine. ECG monitoring (or radionuclide imaging) is performed while the pharmacologic agents are given to detect problems with conduction, heart rate, or strength of contractions.[8]

Radiographic Studies

Chest x-ray. Chest x-rays allow visualization of the lungs, ribs, clavicles, vertebrae, heart, and major thoracic vessels. For patients with impaired perfusion, x-rays are taken to visualize the size of the heart and lung fields.[17]

Ultrasound. An ultrasound of the heart is called *echocardiography*; it is a noninvasive procedure that is used to evaluate the structure and function of the heart. It is used in the diagnosis ventricular hypertrophy, endocarditis, septal defects, and valvular disorders such as valvular stenosis, valvular regurgitation, and mitral valve prolapse. Vascular ultrasound uses a Doppler to identify occlusion or thrombosis of veins and arteries of an extremity. Doppler ultrasound uses a probe that directs high-frequency sound waves to indicate blood flow in the artery.[17]

Arteriogram. This diagnostic procedure allows visualization of the arteries by injecting radiopaque contrast into them so that the location and extent of occlusion can be identified. A cardiac catheterization is one type of arteriogram that allows visualization of coronary arteries and heart chambers. A catheter is passed into the heart through a peripheral vein or artery, depending on whether catheterization of the left or right side of the heart is being performed. Pressures are recorded through the catheter, and radiographic contrast is injected to visualize the patency of coronary arteries.[17]

Venogram. This diagnostic test allows visualization of lower extremity veins to assess blood flow and to determine the size and condition of the veins. The test shows if there is a blockage of blood flow (from a narrowing of the vessel or thrombi as examples). Radiopaque contrast is injected into veins and then an x-ray is taken to visualize the veins under examination. If thrombi are present, the location and extent of thrombi can be identified.[1]

CORE COMPETENCIES

Perfusion

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to perfusion.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to perfusion.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to perfusion for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to perfusion.
- Educate individuals and families regarding self-care related to perfusion including health promotion, illness prevention, and illness management related to perfusion.
- Demonstrate clinical judgment founded on broad knowledge of perfusion.

CLINICAL MANAGEMENT

Clinical management associated with the perfusion concept involves the prevention of illness, early detection, and appropriate collaborative management.

Primary Prevention

Primary prevention includes measures to promote health and prevent disease. For the concept of Perfusion, these measures include promoting heart and peripheral vascular health and preventing abnormal clotting. Promoting heart and peripheral vascular health involves controlling modifiable risk factors by eating a healthy diet exercising most days of the week and not smoking.[20] The US Preventive Services Task Force recommends use of a statin drug for the primary prevention of cardiovascular disease for adults between the ages of 40 and 75 years who have one or more cardiovascular disease risk factors and an estimated 10-year risk of a cardiovascular event of 10% or greater.[21] Common primary prevention strategies are presented in Box 16.1.

Strategies for prevention of blood clotting include minimizing the risks for blood stasis, increased blood viscosity, and vessel injury. Patients at risk for venous stasis or those with clotting disorders are encouraged to enhance blood flow by performing leg exercises, engaging in regular walking, or wearing compression stockings.

Secondary Prevention (Screening)

Secondary prevention includes screening, early diagnosis, and prompt treatment of existing health problems. Its purpose is to shorten the duration and severity of consequences. Routine screening involves monitoring blood pressure and serum lipids.

Blood Pressure Screening

Blood pressure screening is a simple and cost-effective screening recommended across the lifespan. Beginning in infancy, blood pressure screening is recommended at every well-child visit and at least annually.[22] The US Preventive Services Task Force recommends screening for high blood pressure in adults aged 18 to 39 years every 3 to 5 years, and annually for adults 40 years or older and for those who are at increased risk of having high blood pressure.[22] Persons at increased risk include those who have elevated blood pressure (Table 16.2), those who are overweight or obese, and African Americans.

Lipid Screening

Cholesterol screening is also an important secondary prevention against perfusion. By doing this the healthcare team can find possible elevations that could increase the risk for atherosclerosis and plan intervention. Screening should start early in life and be completed every 5 years for those who are 20 years or older with a low risk for cardiovascular disease. Screening should be completed more frequently for those with a high risk of cardiovascular disease.[23]

Collaborative Interventions

The management of individuals with impaired perfusion is highly dependent on the specific condition. The subsequent sections describe common interventions implemented in the treatment of conditions resulting in impaired perfusion. Some of these conditions are also listed as primary prevention measures. They are listed again here because these same measures are useful to improve health for those with impaired perfusion.

BOX 16.1 Health Promotion Recommendations: Perfusion

1. Eat a healthy diet.
   - Choose foods low in sodium, saturated fat, and trans fats.
   - Eat plenty of fruits, vegetables, fiber-rich whole grains, legumes, nuts.
   - Choose fish and skinless poultry; avoid red meat; if you choose to eat meat, choose lean cuts of meat.
   - Select lower fat dairy products: fat-free or low-fat dairy products.
   - Limit sugar-sweetened beverages.
2. Participate in physical activity.
   - Adults >20 years of age should engage in 150 min of moderate-intensity activity/week or 75 min of vigorous intensity activity every week.
   - Children 12 to 19 years of age should engage in at least 60 min of moderate intensity activity every day.
3. Refrain from smoking and have no exposure to environmental tobacco smoke.
4. Maintain blood pressure in recommended range.
   - Adults >20 years of age: <120/<80 mm Hg
   - Children 1 to 13 years of age: <90th percentile
   - Children aged ≥13 years of age: <120/<80 mm Hg
5. Achieve and maintain desirable weight.
   - Adults >20 years of age: 18.5–24.9 BMI
   - Children 12 to 19 years of age: <85th percentile

BMI, body mass index.
Data from American Heart Association (2019). Understanding your risks to prevent a heart attack. Retrieved from https://www.heart.org/en/health-topics/heart-attack/understand-your-risks-to-prevent-a-heart-attack?s=q%3Drisk%2520factors%2520for%2520coronary%2520artery%2520disease%26sort%3Drelevancy

TABLE 16.2 Blood Pressure Guidelines for Adults

Normal range	SBP <120 and DBP <80
Elevated blood pressure	SBP 120–129 and DBP <80
Stage 1 hypertension	SBP 130–139 or DBP 80–89
Stage 2 hypertension	SBP ≥140 or DBP ≥90
Hypertensive crisis	SBP >160 and/or DBP >120

DBP, diastolic blood pressure; *SBP*, systolic blood pressure.
From Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Jr., Collins, K. J., Dennison Himmelfarb, C., et al. (2016). 2017. ACC/AHA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: Executive summary: A report of the American College/American Heart Association task force on clinical practice guidelines. *Hypertension, 71*(6), 1269–1324.

Nutrition Therapy

Nutrition therapy should meet the recommendations described under Primary Prevention, but the goal of the heart-healthy diet is tertiary prevention—to lower serum lipid levels, lose weight, and maintain an optimal weight. For this reason, nutrition therapy is considered an intervention in both primary prevention and disease management.

Smoking Cessation

Smoking cessation is also considered both primary prevention and collaborative intervention for disease management. For interventions directed at smoking cessation, refer to Concept 18, Gas Exchange.

Activity and Exercise

Activity and exercise are a regular part of any treatment regimen. Specifically, they are included in the following applications:

- For the purpose of weight loss and weight maintenance
- Increase in high-density lipoprotein
- Cardiac rehabilitation after acute coronary syndrome
- Progressive activity for patients with peripheral arterial disease

Pharmacotherapy

Pharmacotherapy represents one of the most common collaborative interventions for individuals with conditions associated with cardiovascular disease. The following are the general classifications of drugs; there are many types of drugs within each of these categories:

- *Positive inotropes* increase myocardial contraction strength. These drugs can be used in individuals with severe heart failure in order to increase both central and peripheral perfusion. Common examples include dopamine, dobutamine, milrinone, and digoxin.
- *Vasodilators* increase the diameter of blood vessels in a variety of ways that block normal mechanisms. They are used to treat hypertension and angina. Common examples include angiotensin-converting enzyme inhibitors (captopril, lisinopril, and losartan), nitrates (amyl nitrite, nitroglycerine, and nitroprusside), potassium channel activators (diazoxide and minoxidil), and smooth muscle relaxants (hydralazine).[24]
- *Vasopressors* decrease or vasoconstrict the diameter of blood vessels. They are used to treat hypotension resulting from hemorrhage, myocardial infarction, septicemia, or drug reactions. Examples include epinephrine, norepinephrine, and dobutamine.[24]
- *Diuretics* promote the formation and excretion of urine by preventing reabsorption of sodium in the kidneys. They are used to reduce blood volume to treat hypertension. Common examples include loop (furosemide), thiazide (hydrochlorothiazide), potassium-sparing (spironolactone), and osmotic (mannitol).[24]
- *Antidysrhythmics* correct erratic electrical impulses to create regular cardiac rhythms. They are used to treat premature ventricular contractions, tachycardia, hypertension, and atrial fibrillation. These agents act by blocking electrolytes that affect electrical conduction in the heart, such as potassium (amiodarone) and calcium (diltiazem), or by blocking β-adrenergic receptors (atenolol).[24]
- *Cardioglycosides* have a positive inotropic effect with a lowering of heart rate to increase cardiac output and are used for the treatment of heart failure, atrial fibrillation, and cardiogenic shock. The classic example is digoxin.[24]
- *Anticoagulants* prevent blood clotting at several locations in the clotting cascade. They are most effective in preventing venous thrombosis. Common examples include heparin, warfarin, sodium, enoxaparin, dabigatran, and rivaroxaban.[24]
- *Antiplatelet* agents prevent platelets from aggregating to form clots. They are most effective in preventing arterial thrombosis. Classes of antiplatelet agents are glycoprotein inhibitors (tirofiban), platelet adhesion inhibitor (dipyridamole), thrombin inhibitor (bivalirudin), and platelet aggregation inhibitors (aspirin and clopidogrel).[24]
- *Thrombolytics* disrupt blood clots that are impairing perfusion by lysing fibrin. Common examples include tissue plasminogen activator, alteplase, and urokinase.
- *Antilipidemics* decrease the levels of lipids that contribute to atherosclerosis and cause blood vessel occlusion by reducing the synthesis of cholesterol. The primary group of drugs used are statins (e.g., atorvastatin, fluvastatin, lovastatin, and pravastatin).[24]

Procedures and Surgical Interventions

A variety of procedures and surgical interventions are used to improve central perfusion and tissue perfusion. Myocardial contractions can be improved by performing defibrillation or inserting a pacemaker. Blood flow through the heart can be improved by replacing heart valves.

Blood flow through coronary and peripheral arteries is improved in several ways: by surgically bypassing the obstruction, compressing the obstruction (e.g., angioplasty and inserting stents to maintain patency) or removing the obstruction (e.g., endarterectomy or thrombectomy).

Defibrillation and cardioversion. Defibrillation is used to change abnormal cardiac rhythms by passing an electric shock through the heart that is sufficient to depolarize myocardial cells so that the sinoatrial node will resume its role as pacemaker. Defibrillation is used for emergency treatment during cardiac arrest when ventricular fibrillation or ventricular tachycardia is present. Synchronized cardioversion is a therapeutic procedure delivered on a nonemergent basis to convert an abnormal rhythm, such as ventricular tachycardia with a pulse or atrial fibrillation, to a normal sinus rhythm.[3] Cardioversion uses a lower voltage of electricity than does defibrillation and is also synchronized to deliver the electricity at a particular point in the cardiac cycle to avoid further complications such as fatal dysrhythmias.

Pacemaker. This electronic device is used to maintain a minimum heart rate by electronically stimulating the myocardium. It can be used for persistent, symptomatic bradycardia or for certain heart blocks that result in a decreased cardiac output. The basic pacing circuit consists of a battery-operated pulse generator and one or more conducting leads that pace the atrium and one or both ventricles. Pacemakers can be external (temporary) or surgically implanted (permanent).[3] Pacemakers can be set to pace the atria, the ventricles, or both

and can also be set to pace continuously or only when the heartrate drops lower than a predetermined rate.

Ventricular assist device. Individuals who have severe heart failure may be candidates for a ventricular assist device. This type of device helps inefficient ventricles to pump sufficient blood to meet the body's metabolic demands. These devices can be for either the left ventricle, right ventricle, or both depending on the condition of the individual.

Heart valve replacement. Heart valve replacement is indicated for patients with valves that have stenosis (do not open completely) or insufficiency (do not close completely). Heart valves are repaired or replaced with a prosthetic valve. Valves may be mechanical or biologic. Mechanical valves are constructed of metal alloys, pyrolytic carbon, and Dacron, whereas biologic valves are constructed from bovine, porcine, or human (cadaver) cardiac tissue, and usually contain some human-made materials.[3]

Arterial bypass graft. The two most common areas for arterial bypass include coronary bypass and peripheral artery bypass. Coronary revascularization is accomplished with a coronary artery bypass graft. This procedure surgically implants patent blood vessels to transport blood between the aorta and the myocardium distal to the obstructed coronary artery or arteries. The internal mammary artery, radial artery, and saphenous vein of the patient are used frequently as bypass grafts. Coronary artery bypass graft requires a sternotomy to gain access to the heart and cardiopulmonary bypass to divert the patient's blood from the heart to the cardiopulmonary bypass machine. The cardiopulmonary bypass machine oxygenates the patient's blood and returns it to the patient, allowing the surgeon to operate on a nonbeating, bloodless heart while perfusion to organs is maintained.[3]

Peripheral artery revascularization is a surgical procedure using an autogenous vein or synthetic graft to bypass the lesion in the artery that is impairing perfusion. Femoropopliteal bypass is an example of this procedure, in which a graft is attached to the femoral artery to divert blood around the occlusion and attached to the popliteal artery.[3] The femoral artery is clamped proximal to the insertion of the graft, allowing the surgeon to attach the graft to a bloodless artery.

Angioplasty with stent placement. Cardiac catheterization and coronary angiography provide images of coronary circulation to identify lesions blocking coronary arteries. If appropriate, revascularization can be performed using balloon angioplasty. During this procedure, a catheter equipped with an inflatable balloon tip is inserted into the affected coronary artery. When the blockage is located, the catheter is passed through it, the balloon is inflated, and the blockage (atherosclerotic plaque) is compressed, which dilates the artery. Intracoronary stents are often inserted into the artery during an angioplasty to hold the artery open. A stent is an expandable mesh-like structure designed to expand the artery to maintain patency.[3]

Endarterectomy. This surgical procedure removes obstructing plaque or blockage from the lining of an artery to improve perfusion. The carotid artery is a common site for this procedure, resulting in improved perfusion to the brain and thereby preventing an ischemia stroke.[3]

Thrombectomy. This procedure removes a thrombus from a vessel through a catheter placed percutaneously or as an open surgical procedure (e.g., direct arteriotomy or venous thrombectomy).[3]

Cardiac transplant. This procedure involves the replacement of a diseased heart with a healthy donor heart (from a person after death). A cardiac transplant is indicated in a variety of terminal or end-stage heart conditions.[3] It has become a relatively common procedure, with 3817 individuals undergoing this procedure in 2021.[25]

CLINICAL NURSING SKILLS FOR PERFUSION

- Assessment
  - Measure vital signs
  - General inspection for color, respiratory effort, distress
  - Inspect the thorax
  - Palpate the precordium.
  - Auscultate heart and vascular sounds
  - Inspect extremities for skin color
  - Palpate extremities for edema
  - Palpate peripheral pulses
  - Assess capillary refill
  - When indicated, calculate the ankle-brachial index, measure leg circumferences, calculate pulse deficit
- Cardiac monitoring
- Hemodynamic monitoring
  - Continuous arterial blood pressure monitoring
  - Pulmonary artery pressure monitoring
- Medication administration
  - Oral medications
  - Intravenous fluids and medications
- Sequential compression devices and elastic stockings
- Ambulation
- Positioning
- Patient teaching

INTERRELATED CONCEPTS

Because all cells in the body depend on perfusion to carry oxygen and nutrients to cells, this concept is interrelated with nearly all of the health and illness concepts within this textbook. Concepts that are most closely interrelated with perfusion are shown in Fig. 16.3 and are subsequently explained.

Patients complain of **Pain** when perfusion is impaired by blood clots (**Clotting**) or narrowed arteries, whether it be in the coronary arteries, causing chest pain, or in the iliac or femoral arteries, causing leg pain when walking. Impaired tissue perfusion, leading to ischemia, creates lactic acid that contributes to pain. Because impaired tissue perfusion to the legs causes pain during walking, peripheral arterial disease reduces the **Mobility** of patients. Walking is beneficial to exercise the heart and improve central perfusion, an important health promotion behavior. **Nutrition** also is an important health promotion consideration for heart and vessel health—and adequate perfusion in the gastrointestinal system is necessary for the digestion and metabolism of nutrients. **Inflammation** occurs when there is tissue damage, which is linked to ischemia. Also, it is the

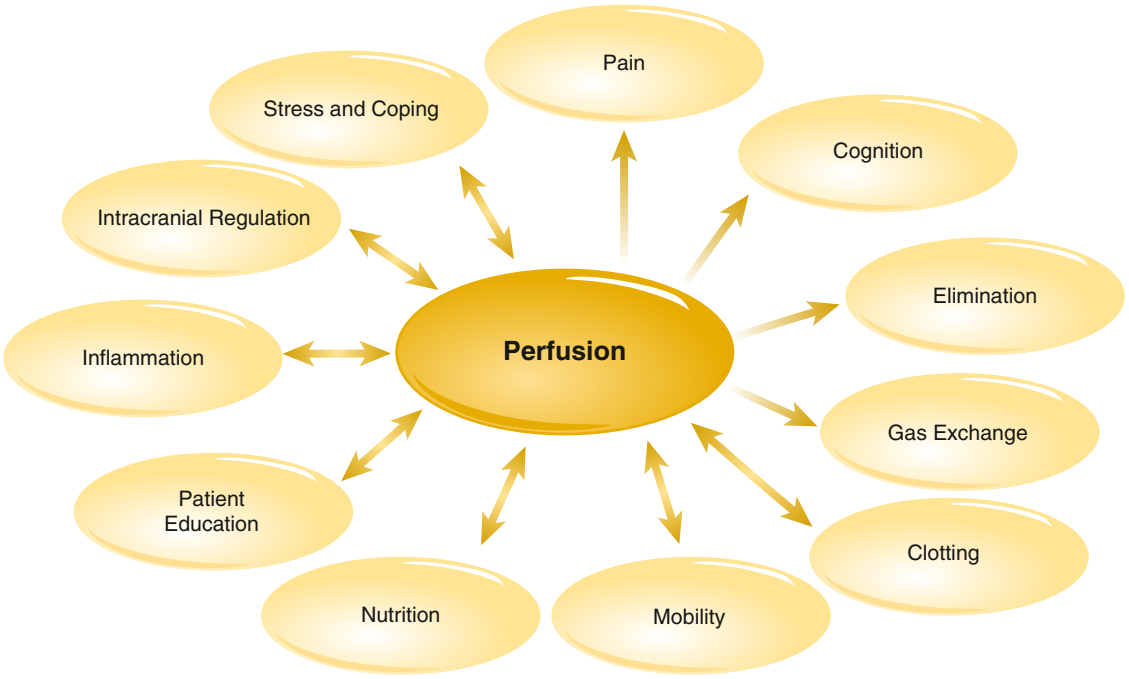

Fig. 16.3 Perfusion and Interrelated Concepts.

inflammation that develops after damage to the endothelium of arteries that initiates atherosclerosis. Impaired perfusion results in impaired **Gas Exchange** because the blood carries oxygen from alveoli to cells and carbon dioxide away from cells to alveoli for exhalation. **Elimination** from the kidneys is an indirect indicator of cardiac output because blood flows from the heart through the aorta to the renal arteries and through nephrons that produce urine. Although **Stress** creates sympathetic responses that increase heart rate and blood pressure to affect blood flow, implementing adaptive **Coping** behaviors can reduce or eliminate the cardiovascular effects of stress. Because the brain is highly dependent on the steady perfusion of oxygenated blood, **Intracranial Regulation** is an interrelated concept. Interruption of cerebral blood flow, whether from cerebral blood clots or cerebral hemorrhage, can lead to brain tissue injury or death. **Cognition** is also altered when perfusion to the brain is impaired. **Patient Education** is central to the prevention and management of cardiovascular disease.

CLINICAL EXEMPLARS

Multiple conditions contribute to impaired perfusion—far more than are described in this text. Box 16.2 lists common conditions associated with impaired perfusion across the lifespan; further details about these conditions can be found in pathophysiology, medical–surgical, and pediatric nursing textbooks.

Featured Exemplars

Atrial Fibrillation

This cardiac dysrhythmia is characterized by disorganized electrical activity from impulses that trigger atrial contraction that are not initiated from the sinoatrial (SA) node. The result is ineffective atrial contraction, with atrial rates as high as 350 to 600 beats/min. Because the ventricles do not have time to fill, cardiac output is reduced. The pulse rhythm is irregularly irregular. Atrial fibrillation may occur in brief episodes or may be permanent. It is the most common, clinically significant dysrhythmia with respect to morbidity and mortality rates.[10] Approximately 2% of people younger than age 65 years and approximately 9%

BOX 16.2 EXEMPLARS OF IMPAIRED PERFUSION

Central Perfusion

Cardiac Dysrhythmias
- Asystole
- Atrial fibrillation
- Third-degree heart block
- Ventricular fibrillation

Valvular Heart Disease
- Aortic stenosis or insufficiency
- Mitral valve stenosis or insufficiency

Congenital Defects
- Atrial septal defect
- Coarctation of the aorta
- Tetralogy of Fallot
- Ventricular septal defect

Shock
- Anaphylactic shock
- Cardiogenic shock
- Hypovolemic shock
- Neurogenic shock
- Septic shock

Other Conditions Associated With Central Perfusion
- Cardiomyopathy
- Cor pulmonale
- Endocarditis
- Heart failure
- Pulmonary hypertension
- Ruptured arterial aneurysm (leading to hemorrhagic shock)

Local/Tissue Perfusion
- Acute myocardial infarction
- Arterial embolism
- Atherosclerosis
- Hyperlipidemia
- Hypertension
- Peripheral artery disease
- Pulmonary embolism
- Raynaud disease
- Sickle cell disease
- Stroke
- Venous thromboembolism

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of people older than age 65 years have atrial fibrillation. Clots may form in the atria from blood stasis, which can become emboli that flow to the brain causing strokes. Atrial fibrillation accounts for as many as 20% of all ischemic strokes.[20]

Acute Myocardial Infarction

When perfusion from the coronary arteries is impaired, sustained ischemia causes irreversible myocardial cell death (necrosis) resulting in acute myocardial infarction. Acute myocardial infarction – often referred to as AMI – is one part of acute coronary syndrome, which also includes unstable angina caused by temporary ischemia to the myocardium and specific types of acute myocardial infarction. Most acute myocardial infarctions are caused by a thrombus or occlusion that impairs blood flow. Risk factors include medical conditions (such as coronary artery disease, hypertension, hyperlipidemia, and diabetes) and lifestyle choices (such as smoking, excessive alcohol use, physical inactivity, unhealthy diet, and excessive alcohol use). Chest pain; pain or discomfort in one or both arms, the jaw, back, or stomach; shortness of breath; lightheadedness; and nausea are common symptoms.

Heart Failure

Heart failure develops when either ventricle fails to pump efficiently. This condition can develop in response to a weak myocardium that is unable to adequately pump blood or excessive afterload that increases the work of the heart. This causes pressure to back up through the chambers of the heart and ultimately reduces perfusion and causes fluid overload. Heart failure is associated with hypertension, coronary artery disease, diabetes, and obesity. Heart failure can be categorized into left- and right-sided heart failure. In left-sided failure, the most common type, the impairment, causes blood to back up into the left atrium and pulmonary veins, producing dyspnea; coughing up pink, foamy mucus; and irregular heartbeat (S_3 heart sound). In right-sided failure, the blood backs up into the right atrium and venous circulation, producing edema of legs, feet, and ankles, and weight gain from fluid retention. Many individuals who start with left-sided heart failure develop right-sided heart failure without proper treatment.

Hyperlipidemia

Elevated blood levels of cholesterol and triglycerides indicate hyperlipidemia. Diets high in cholesterol and genetic inheritance are common causes of hypercholesterolemia. Triglycerides are a simple fat compound obtained from animal and vegetable fats. High cholesterol has no symptoms, but it thickens arterial walls in coronary or cerebral vessels, leading to myocardial infarction or stroke.

Hypertension

Hypertension occurs when there is excessive pressure or force of blood flowing through arteries. Nearly half of American adults have hypertension, and the risk increases with age. Criteria for normal blood pressure is a systolic pressure less than 120 mm Hg and a diastolic pressure less than 80 mm Hg. Four classifications of hypertension are presented in Table 16.2

Elevated blood pressure increases the workload of the heart and damages endothelium contributing to atherosclerosis. Because hypertension usually has no symptoms, people should routinely have their blood pressures measured. Nearly half of American adults have hypertension, and the risk increases with age.[26]

Peripheral Artery Disease

The gradual thickening of arterial walls reduces perfusion in upper and lower extremities, resulting in peripheral artery disease. Risk factors include tobacco use, hyperlipidemia, uncontrolled hypertension, and diabetes mellitus. The risk for peripheral artery disease increases with age and typically appears in the sixth to eighth decades. Manifestations include decreased to absent peripheral pulses; cool skin temperature; loss of hair and thin, taut, shiny skin on affected extremities; and ischemic pain during exercise (intermittent claudication).[14]

CASE STUDY

joyfnp/iStock/Thinkstock

Case Presentation

George Jones is a 59-year-old male who has arrived at the emergency department with chest pain. He had experienced this chest pain for 30 minutes, and it was not relieved after taking four nitroglycerin tablets 5 minutes apart. He reports the pain feels "like an elephant is sitting on my chest." He is diaphoretic and appears anxious. His vital signs are as follows: temperature, 99°F; blood pressure, 100/68 mm Hg; heart rate, 110 beats/min; and respiratory rate, 24 breaths per minute. Mr. Jones is overweight and has type 2 diabetes, hyperlipidemia, and hypertension. He quit smoking last year after a 40-year history of smoking one pack of cigarettes a day. His troponin level is elevated, and his ECG shows ST segment elevation. The nurse administers oxygen and draws blood for arterial blood gas analysis. Mr. Jones is told he will undergo cardiac catheterization to locate the blockage, determine its severity, and evaluate left ventricular function.

Cardiac catheterization revealed a 90% blockage in one coronary artery. The cardiologist performed a balloon angioplasty and placed a stent in Mr. Jones's blocked coronary artery to reestablish perfusion. Mr. Jones was admitted to the cardiovascular surgery unit and was ambulating within 24 h of stent placement. The nurse's goals for Mr. Jones's plan of care are to maintain effective cardiac output, control pain, relieve anxiety, and balance physical activity with energy-conserving activities. The nurse also played a significant role in Mr. Jones's therapy by teaching him and his family about lifestyle changes, including diet and exercise, and the purpose of his prescribed medications, including adverse effects and the importance of adhering to the medication regimen. Mr. Jones is referred for cardiac rehabilitation after discharge.

Case Analysis Questions

1. What risk factors does Mr. Jones have for impaired perfusion?
2. Does this case exemplify an impairment of local perfusion, central perfusion, or both?

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CONCEPT
17

Clotting

Amy Burlar

All cells depend on a consistent supply of blood. When injury occurs to veins and arteries, the clotting process is initiated to stop the blood loss. This represents an important physiological protective mechanism allowing the body to maintain homeostasis when injury occurs. However, excessive clotting can impair perfusion, whereas inadequate clotting increases blood loss. For this reason, clotting is a critical concept for nurses to understand and incorporate into practice. Nurses should identify individuals at risk of impaired clotting, recognize when individuals are experiencing impaired clotting, and respond with appropriate interventions.

DEFINITION

For the purposes of this concept presentation, clotting is defined as *a physiological process in which blood is converted from a liquid to a semisolid gel.* This is a normal and expected physiological event that usually starts when veins or arteries are injured.[1] Multiple coagulation factors interact in a sequence with fibrin and platelets to form a blood clot. The result of the clotting process is *hemostasis,* a term that refers to the stoppage of blood flow or bleeding.

The clotting process can become impaired in two ways. First, when clotting factors are not available, patients experience excessive bleeding. Alternatively, if blood clots form when they are not physiologically indicated, then a *thrombus* (blood clot) may obstruct blood vessels and interfere with blood flow. Effects of impaired clotting vary depending on the extent of impairment and the anatomic location.

SCOPE

The concept of Clotting and problems associated with impaired clotting represent a variety of physiological processes. The scope of the concept represents a continuum ranging from excessive clotting beyond physiological need at one end of the spectrum to impaired clotting resulting in bleeding at the other end. Expected physiological clotting processes fall in the middle of this continuum. Both excessive clotting and ineffective clotting may occur locally or systemically. Fig. 17.1 depicts the continuum of clotting as a concept.

NORMAL PHYSIOLOGICAL PROCESS

The homeostatic process is a protective mechanism to prevent excessive bleeding when vascular injury occurs and is achieved through a complex coagulation process. In a normal clotting process, the damaged vessels, platelets, and clotting factors work together to stop bleeding.

The first response is vasoconstriction, which reduces blood flow, allowing the clotting process to start. Bleeding is slowed further when accumulating blood surrounding the blood vessel creates pressure against the walls of the affected vessel.

The second response, triggered by the damaged blood vessel, is formation of a platelet plug. Platelets are activated and stick to the injured blood vessel because of a protein (called *von Willebrand factor*) produced by the cells of the vessel wall. The platelet plug develops in 3 to 5 minutes.[1]

Fig. 17.1 Scope of Concept: Clotting.

Next, clotting factors are activated either from the intrinsic or from the extrinsic pathway and proceed in a coagulation cascade to the common final pathway. The difference between intrinsic and extrinsic pathways has to do with the initiation of the clotting factors. The intrinsic pathway is activated by collagen exposure when there is damage to the surface of the blood vessel (within the vessel). The extrinsic pathway is initiated when damaged tissues release tissue factor or tissue thromboplastin (external to the blood vessel).

Both intrinsic and extrinsic pathways converge to follow a common final pathway whereby thrombin stimulates fibrinogen to form insoluble fibrin that stabilizes the clot.[2] Fig. 17.2 illustrates the coagulation cascade.

VARIATIONS AND CONTEXT

Variations in clotting may occur in individuals across the lifespan with a wide range of effects, and they represent conditions associated with excessive clotting or conditions associated with excessive bleeding. Variations in the normal clotting process occur in relation to the presence of clotting factors, the size of the vessel affected, the type of vessel (artery or vein), and the location of the bleeding. When there is an excess of clotting factors, thrombi may form; a deficit of clotting factors may produce bleeding. A significant difference results depending on whether the blood vessel is small or large. The pressure of blood is greater in arteries compared with that in veins. A simple paper cut of a finger can cause immediate bleeding from a vein in a small area of the body, whereas severing a major artery can result in severe blood loss and perhaps death. The location of the bleeding is another variable. For example, bleeding from a weakened artery within the brain can cause immediate neurologic deficits and perhaps death, whereas bleeding from veins injured by a skinned knee impairs the skin integrity, causes some discomfort, and can potentially heal without a scar.

CONSEQUENCES

Pathophysiological Consequences of Excessive Clotting/Thrombi

Normal homeostatic processes can become impaired when excessive clotting factors lead to thrombus formation. A thrombus can form in arteries or veins. The effect of one or multiple thrombi can vary from partial obstruction to complete occlusion of the affected vessel(s).

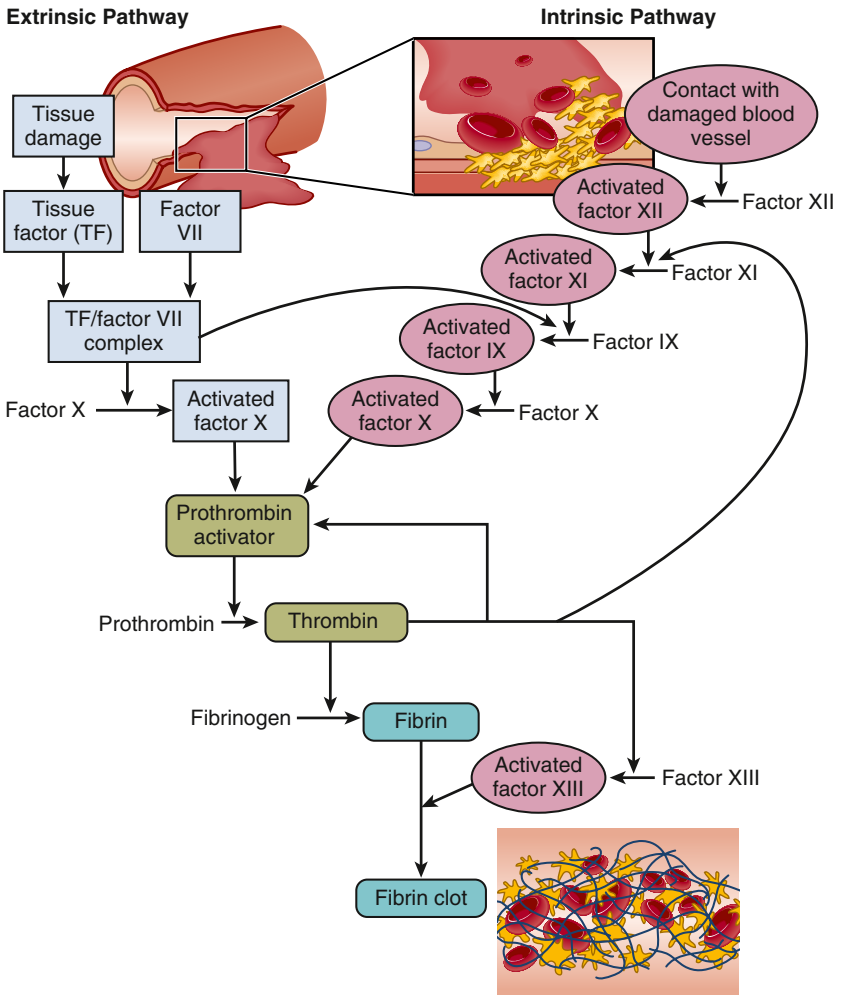

Fig. 17.2 Coagulation Cascade. Coagulation cascade showing steps in the intrinsic and extrinsic pathways. (From Lewis S. et al., editors (2020). *Medical–surgical nursing: Assessment and management of clinical problems* (11th ed.). St Louis: Elsevier.)

Arterial Thrombosis

Arterial thrombi are associated with conditions that increase platelets or erythrocyte production or create turbulent blood flow with platelet adhesion. Another source of thrombi is atherosclerosis, which begins with injury to the endothelium. Causes of endothelial injury include hypertension, the increased pressure of blood in the arteries creating a shearing force, exogenous chemical agents, such as toxins from cigarette smoke, and endogenous agents, such as cholesterol.

When a thrombus blocks an artery, it interrupts the flow of oxygenated blood to the tissue, leading to ischemia. If left untreated, this results in cell death; however, if adequate collateral circulation exists, it can compensate for the reduced blood flow in the blocked artery and avert cell death. The pathologic consequence of such an event is determined by the artery location (e.g., coronary artery, cerebral artery, and femoral artery) and the size of the thrombus in relation to the size of the affected artery. A large thrombus in a small artery may stop the flow of blood, whereas a small thrombus in a large artery may create turbulence and slow blood flow. A thrombus that detaches from an artery becomes an embolus and can lodge in another artery. For example, a small arterial emboli flowing through a cerebral artery can cause transient ischemia, or a larger arterial emboli can lodge in a cerebral artery creating a cerebrovascular accident (stroke).

Venous Thrombosis

Venous thrombosis is the formation of a blood clot in a vein—usually in association with inflammation within the vein. Superficial and deep veins may be affected. Three factors associated with the formation of venous thrombosis are hypercoagulability of the blood, injury to the vessel wall endothelium, and stasis of blood flow.[2] These three factors are commonly known as the Virchow triad (Fig. 17.3). Endothelial damage of the vein initiates the release of clotting factors or activates platelets. Stasis of venous blood occurs when there is dysfunction of venous valves, inactivity of the muscles of the extremity, or change in unidirectional venous blood flow.

Similar to arterial thromboses, venous thrombus that detaches from a vein can become an embolus and lodge in another vein. For example, a thrombus from a deep vein thrombus in the leg can lodge in pulmonary vessels, creating a pulmonary embolus.

Pathophysiological Consequences of Inadequate Clotting/Bleeding

Bleeding occurs after injury to arteries and veins, but it also can occur spontaneously when the factors needed for clotting are reduced. These clotting factors include platelets and clotting factors II (prothrombin), VII, VIII, IX, and X. The extent of bleeding can be as minor as bruising or as significant as hemorrhage. Thrombocytopenia is defined as a platelet count less than 150,000/mm^3, although the decrease is not considered significant unless the platelet count declines to less than 100,000/mm^3. When the platelet count declines to less than 50,000/mm^3, the risk for hemorrhage after minor trauma increases and petechiae, purpura, or ecchymosis may form. Spontaneous bleeding without trauma,

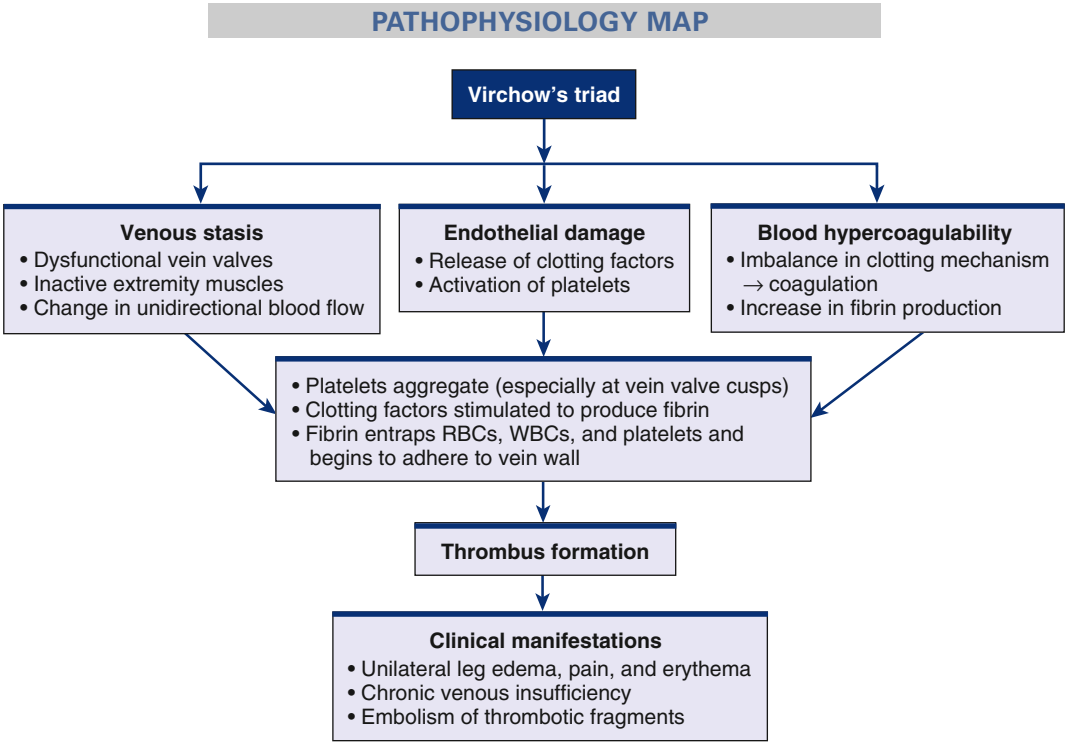
PATHOPHYSIOLOGY MAP
Virchow's triad
Venous stasis
• Dysfunctional vein valves
• Inactive extremity muscles
• Change in unidirectional blood flow
Endothelial damage
• Release of clotting factors
• Activation of platelets
Blood hypercoagulability
• Imbalance in clotting mechanism → coagulation
• Increase in fibrin production
• Platelets aggregate (especially at vein valve cusps)
• Clotting factors stimulated to produce fibrin
• Fibrin entraps RBCs, WBCs, and platelets and begins to adhere to vein wall
Thrombus formation
Clinical manifestations
• Unilateral leg edema, pain, and erythema
• Chronic venous insufficiency
• Embolism of thrombotic fragments

Fig. 17.3 Virchow Triad. Virchow triad showing the pathophysiology of venous thromboembolism. *RBCs*, red blood cells; *WBCs*, white blood cells. (From Lewis S. et al., editors (2020). *Medical–surgical nursing: Assessment and management of clinical problems* (11th ed.). St. Louis: Elsevier.)

such as a spontaneous nosebleed, occurs when the platelet count ranges from 10,000 to 15,000/mm^3. Liver disease, such as cirrhosis, impairs the liver's synthesis of clotting factors, including factors II, VII, IX, and X. Reduction in the amounts of these clotting factors prevents formation of clots after trauma or hemorrhage.

The effect of hemorrhage on an individual varies with the percentage of blood volume lost. With the loss of more than 30% of blood volume, the person has tachycardia at rest, postural hypotension, and decreasing urine output. With the loss of 40% of blood volume, there is irreversible destruction of tissue that can lead to further hemorrhage, which leads to shock and potentially death.[3]

Hemolytic anemia can be a consequence of various conditions that affects several body systems, such as the spleen, heart, and lungs. The effects on the respiratory system include increased respiratory rate and dyspnea on exertion. The cardiovascular system responds by increasing the heart rate and peripheral vasoconstriction. The effect on the nervous system is the emergence of confusion, anxiety, dizziness, and fainting.[2] The skin and mucous membranes become pale, and the person experiences weakness and fatigue.

RISK FACTORS

Populations at Risk

Older adults have increased risk for clotting because of expected physiological changes that occur with advanced age such as increased platelet adhesiveness,[4] which promotes blood stasis.

Individuals who are Black are more likely to have a genetic disorder called sickle cell anemia. When affected persons experience hypoxia, dehydration, low temperature, or metabolic acidosis, their red blood cells (RBCs) change to a shape of a sickle, which results in abnormal clotting in peripheral arteries, causing ischemia and pain.[4]

Individual Risk Factors

Impaired clotting potentially affects all individuals regardless of age, sex, race, or socioeconomic status. Common risk factors are described in the following sections.

Genetics

Several genetic disorders are associated with hematologic conditions. The classic example is hemophilia, a recessive genetic disorder caused by the inability to produce adequate clotting factors needed for blood coagulation. Hemophilia A and hemophilia B are similar in that they are both recessive sex-linked genetic disorders in males whose affected clotting factor is defective or deficient. The difference between these types of hemophilia is the affected clotting factor. In hemophilia A, factor VIII is deficient, whereas in hemophilia B, factor IX is deficient. By contrast, von Willebrand disease is a bleeding disorder that is an autosomal dominant genetic disorder affecting both sexes. Affected individuals have deficiencies in von Willebrand factor coagulation protein and factor VIII and platelet dysfunction. Deficiencies of these clotting factors result in spontaneous bleeding, including nosebleeds and hematuria (blood in urine).[4]

Immobility

Immobility contributes to blood clot formation by slowing the return of venous blood to the heart. Slow blood flow results in stasis, a risk factor for thrombi formation. Immobility may occur as a result of paralysis or an unconscious or impaired cognitive state or from bed rest needed to recover from an illness, injury, or surgery. Individuals who are confined to a sitting position for long periods (e.g., on long airplane flights) are also susceptible to the formation of venous clots.

Smoking

Smoking is a known risk factor that contributes to hypercoagulability of the blood—a contributing factor to clot formation.

ASSESSMENT

Nurses gather data from the patient's history, physical assessment, and diagnostic test results. Adequate clotting is apparent when the patient forms a blood clot after endothelial damage. Other pertinent expected findings include peripheral pulses are present, capillaries refill within less than 2 seconds, and the skin is warm and dry without discolorations, such as bruises, or the presence of edema. Blood pressure and heart rate should also be within expected ranges for the patient's age.

History

The history includes current and past medical conditions. Nurses inquire about patients' chronic diseases. Many medical conditions are associated with bleeding or clotting disorders. Common conditions associated with clotting disorders are presented later (see Box 17.2).

Also included in the history are medications the patient is currently taking because many medications affect clotting.[5] Warfarin (Coumadin) is a commonly prescribed drug that is taken to prevent blood clotting, which works by interfering with the four vitamin K–dependent clotting factors (II, VII, IX, and X). Nurses also ask patients about over-the-counter medications or herbal and dietary supplements they take that may affect clotting. These supplements include bilberry, black cohosh, chamomile, chondroitin sulfate, feverfew, garlic, ginger, ginkgo biloba, ginseng, goldenseal, omega-3 fatty acids, melatonin, niacin, soy, and turmeric.[6]

Lifestyle behaviors are important to assess as part of the history. Exercise habits, including the kind of exercise, how often it is performed, and for what length of time, should be questioned because exercise increases blood flow. Nurses ask patients about smoking habits because nicotine causes vasoconstriction and is a toxin that damages the endothelium, contributing to atherosclerosis.

Bleeding

The nurse should ask about abnormal bleeding from gums (when brushing teeth), from the rectum (after defecation), or after minor trauma. Patients may describe bleeding that takes longer than usual to stop. Patients with bleeding problems may report bleeding in many forms and from various areas of the body, including nosebleeds; new bruises; black, tarry stools; blood from rectum

(hematochezia); blood in the urine (hematuria); blood in emesis (hematemesis); coughing up blood (hemoptysis); or bleeding from the mouth. Indications of intracranial bleeding may include a headache, changes in vision, sudden difficulty talking, or weakness in one arm or leg. Patients may report fatigue or dyspnea from anemia caused by blood loss. When applicable, women are asked about the amount of blood lost during menses and whether the length of menses has increased.

Parents of children with hemophilia may report that the children bleed after minor trauma such as from a circumcision, during loss of deciduous teeth, or after a slight fall. Bleeding into a joint (hemarthrosis) may produce complaints of stiffness, tingling, or ache of knees, elbows, and ankles and hematuria may be reported.[7]

Clotting

The nurse asks patients about recent prolonged sitting, such as on an airplane or in a car, or prolonged bed rest because these are risk factors for venous thrombosis. Nurses should inquire about swelling, redness, and pain in an extremity. They should also ask about a history of atrial fibrillation, which increases risk of atrial emboli into the cerebral circulation. A report of leg pain when walking may indicate insufficient arterial blood flow in the lower extremities.

Examination Findings

Bleeding

When assessing patients with prolonged bleeding, nurses may notice petechiae, ecchymosis, and purpura during inspection of the skin that indicate localized bleeding in the subcutaneous tissue. For patients with hemophilia, subcutaneous and intramuscular hemorrhages are common. Hemarthrosis results in warmth, redness, edema, and severe pain of affected joints preceding decreased joint range of motion.[7] Bleeding into the brain produces varying manifestations of stroke depending on the amount of blood released and the area of the brain affected. When bleeding is excessive, changes to vital signs—specifically increased heart rate and decreased blood pressure—may be noted.

Clotting

When assessing patients with a thrombosis, nurses find different manifestations depending on the location and whether arteries or veins are affected. Clots within veins frequently develop in lower extremities, where they impair perfusion and cause pain, redness, and edema with an increased circumference of the affected extremity. The patient may have a palpable firm vein that is tender to touch. When venous thrombi become emboli, the emboli flow superiorly through the inferior vena cava and lodge in pulmonary capillaries. Manifestations produced from pulmonary emboli vary by location affected and size of the emboli; however, the classic triad includes dyspnea, chest pain, and hemoptysis.[8]

As mentioned previously, an arterial thrombus in the lower extremities impairs perfusion. Accompanying the common reported symptoms of *pain* and *paresthesia* may be other manifestations, such as *pulselessness, pallor,* and *poikilothermia* (cool skin temperature over the affected area). These are often referred to as "the five P's." Blood clots that travel as emboli through the carotid can impair perfusion to the brain, causing a stroke, with manifestations that vary by location affected and size of the emboli.

Diagnostic Tests

Laboratory Tests

Prothrombin time. Prothrombin time (PT) measures the adequacy of the extrinsic system and common pathways in the clotting mechanism, which include clotting factors I (fibrinogen), II (prothrombin), V, VII, and X. When these clotting factors are found in decreased amounts, the PT is prolonged, meaning more time is needed for blood to clot. PT is reported in seconds along with a control value. The patient's value should be approximately equal to that of the control. A normal finding is 11.0 to 12.5 seconds. The PT is used to monitor the therapeutic ranges of anticoagulants such as warfarin (Coumadin) with a therapeutic value 1.5 to 2.5 times normal.[9]

International normalized ratio. The international normalized ratio (INR) was established by the World Health Organization to standardize results regardless of the reagents or methods used to analyze the blood. The INR is used to monitor the effectiveness of anticoagulant therapy such as warfarin (Coumadin) that is given to inhibit the formation of blood clots. Normal values vary depending on the patient's disorder; for example, 1.5 to 2.0 is preferred for prophylaxis for deep vein thrombosis, 2.0 to 3.0 when treating deep vein thrombosis, and 2.0 to 3.0 when treating atrial fibrillation.[9]

Partial thromboplastin time. Partial thromboplastin time (PTT) measures the intrinsic system and common pathway of clot formation, which includes factors I (fibrinogen), II (prothrombin), V, VIII, IX, X, XI, and XII. Factors II, VII, IX, and X are vitamin K–dependent factors. When there are reduced amounts of these clotting factors, the PTT is prolonged, meaning more time is needed for blood to clot. Like the PT values, the PTT is reported in seconds along with a control value. The patient's normal value should be approximately equal to that of the control. A normal finding is 60 to 70 seconds. Activators were added to PTT reagents to shorten normal clotting time and provide a narrow normal range. This shortened time is called *activated PTT (aPTT)*, with a normal value of 30 to 40 seconds. The PTT is used to monitor the therapeutic ranges of patients taking anticoagulants such as heparin, and these therapeutic values are 1.5 to 2.5 times normal.[9]

Fibrinogen. Fibrinogen (or clotting factor I) is part of the common pathway in the coagulation system. It is converted to fibrin by the action of thrombin during the coagulation process. Reduced fibrinogen level occurs in patients with liver disease, malnutrition states, and consumptive coagulopathies such as disseminated intravascular coagulation (DIC). Normal values for adults range from 200 to 400 mg/dL, and those for newborns range from 125 to 300 mg/dL.[9]

Platelet count. Platelet count is the number of platelets (thrombocytes) per cubic millimeter of blood. This test is performed on patients with suspected bleeding disorders or clotting disorders. Normal values are as follows: adults and

children, 150,000 to 400,000/mm^3; premature infants, 100,000 to 300,000/mm^3; newborns, 150,000 to 300,000/mm^3; and infants, 200,000 to 475,000/mm^3.[9]

D-dimer. The D-dimer test assesses the activity of both thrombin, which is used to form blood clots, and plasmin, which is used to break down blood clots. When plasmin breaks down fibrin clots, fibrin degradation products and D-dimer are produced. The D-dimer assay provides a highly specific measurement of the amount of fibrin degradation that occurs as the clot is dissolved. Plasma normally does not have detectable amounts of fragment D-dimer. This test is used to confirm a diagnosis of DIC.[9]

Erythrocyte count, hemoglobin, and hematocrit. These measures are used to diagnose the presence of polycythemia and anemia. Patients with polycythemia have elevated levels of erythrocytes or RBCs, which increases risk of clotting. Patients may develop anemia from blood loss, which is indicated by RBC count, hemoglobin levels, and hematocrit levels less than those that are normal. Normal values for hemoglobin and hematocrit vary depending on factors such as age, sex, and pregnancy status.

Bone marrow examination. An examination of the bone marrow may be done to assess for evidence of hyper- or hypoproduction of platelets and RBCs. This test may be indicated for polycythemia or thrombocytopenia.

Radiologic Tests

Three common radiographic tests to evaluate vessels are useful in the diagnosis of individuals with clotting or bleeding tendencies. In all cases, the test produces an image of the vessel.

- Ultrasound is used as a noninvasive approach to evaluate for venous thrombosis.
- Arteriograms allow visualization of arteries by injecting radiopaque contrast into them so that the location and extent of occlusion or dilation can be identified.[9]
- Venograms of the lower extremities allow visualization of veins by injecting radiopaque contrast into them so that the location and extent of thrombi can be identified.[9]

CORE COMPETENCIES

Clotting

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to clotting.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to clotting.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to clotting for individuals, communities, or populations.
- Implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to clotting.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to clotting.
- Demonstrate clinical judgment founded on broad knowledge of clotting.

CLINICAL MANAGEMENT

Clinical management related to clotting includes health promotion and the management of emerging or present conditions that compromise clotting. The ultimate goal is to optimize the clotting process. The *Healthy People 2020* objectives for bleeding and clotting are summarized in Box 17.1.

Primary Prevention

Primary prevention includes measures to promote health and prevent disease. For problems associated with excessive bleeding, the only true primary prevention measure is genetic counseling. Genetic counseling is advised for couples who have a family history of bleeding disorders and want to start a family. Genetic counseling will assist couples to comprehend the medical facts, understand risks and options, and make an informed decision. Measures to prevent bleeding as a complication of a disease process or medical treatments for other conditions are discussed in the collaborative care section.

For this concept, most primary prevention measures relate to prevention of blood clots. Strategies for prevention include minimizing the risks for blood stasis, increased blood viscosity, and vessel injury. Patients at risk for venous stasis or those with clotting disorders are encouraged to enhance blood flow by performing leg exercises, engaging in regular walking, or wearing compression stockings. High-risk patients (e.g., after knee or hip replacement surgery) are administered anticoagulant therapy as a prophylactic measure. These agents are further discussed later. Women with an increased risk for clots may be advised to avoid taking birth control pills because of their adverse effect on clotting. Teaching patients about the importance of not smoking is a priority because nicotine causes vasoconstriction, which contributes to stasis of blood flow, and damages the endothelium, contributing to atherosclerosis. Maintaining adequate hydration reduces the potential for increased blood viscosity.

Secondary Prevention (Screening)

Secondary prevention includes screening, early diagnosis, and prompt treatment of existing health problems. There are no routine screening tests indicated for the general public related to this concept.

Collaborative Interventions for Bleeding Disorders

Prevention and Control of Bleeding

Prevention and control of bleeding are the cornerstones for management of individuals with bleeding disorders. Patients must learn to recognize signs and symptoms of bleeding and to notify the healthcare provider when indications of bleeding occur. They also must be taught strategies to minimize risk for trauma. Patients with bleeding disorders or individuals who are

BOX 17.1 Healthy People 2030 Objectives for Blood Disorders

1. Reduce the proportion of people with severe hemophilia who have more than 4 joint bleeds each year.
2. Increase the proportion of people with von Willebrand disease who are diagnosed by age 21 years.
3. Increase the proportion of people with sickle cell disease on Medicare who received disease-modifying therapies.

From Healthy People 2030. *Topics and objectives*. Retrieved from https://health.gov/healthypeople/objectives-and-data/browse-objectives/blood-disorders

taking anticoagulants are taught to avoid taking drugs that contribute to bleeding, such as any drugs containing aspirin. They are encouraged to avoid situations that could cause injury resulting in bleeding, such as participation in contact sports. Nurses may teach strategies designed to avoid bleeding. For example, patients learn to use a soft-bristle toothbrush to avoid bleeding from gums from brushing teeth. They use an electric razor rather than a blade razor to avoid nicks to the skin. Patients are encouraged to avoid blowing their nose forcefully to reduce the likelihood of nosebleeds. They should avoid getting tattoos and body piercings. Women who are menstruating should count the number of pads or tampons they use daily and notify the healthcare provider if that number increases. Patients should understand the importance of notifying healthcare personnel before seemingly benign invasive procedures such as teeth cleaning, manicure, or pedicure.[10]

Medications given by injection should be avoided if possible to prevent the needle stick that causes bleeding. When an injection is unavoidable, nurses use the smallest size needle possible. In addition, nurses monitor laboratory tests such as INR to assess risk and to provide direction in medication management.

Management of Bleeding Episodes

During episodes of active bleeding, the obvious goal is to control hemorrhage. Direct pressure over bleeding sites is indicated. The use of topical agents (e.g., Gelfoam or fibrin foam) might also help slow the bleeding. Ice applications are also indicated for topical bleeding or bleeding within a joint space. Pharmacologic agents and supportive care, such as volume replacement and oxygen support, may be needed to prevent the progression of bleeding to the point of hemodynamic instability.

Pharmacotherapy

Clotting factor replacement or stimulating agents. Several agents are used to replace factor VIII and factor IX—the deficient clotting factors associated with hemophilia. Desmopressin acetate is a synthetic vasopressin agent that stimulates the release of factor VIII and von Willebrand factor. This agent is useful for milder forms of hemophilia.[11]

Platelet replacement agents. Several pharmacologic agents are used to increase the number of platelets. Platelet growth factor agents (e.g., oprelvekin, romiplostim, and eltrombopag) stimulate bone marrow production of platelets.[11] A transfusion of platelets is also a way to increase a patient's platelet volume, but this is generally performed to treat life-threatening hemorrhage.

Collaborative Interventions for Clotting Disorders

Because there are several conditions that can lead to clotting, collaborative interventions are dependent on the underlying cause.

Pharmacotherapy

Several groups of drugs are used to treat individuals with clotting disorders and to prevent the formation of clots among high-risk individuals. Refer to Fig. 17.2 for assistance with understanding drug actions.

Anticoagulants. Two common anticoagulant agents used to prevent the formation of blood clots are warfarin and heparin. Warfarin (Coumadin) acts by decreasing the production of four vitamin K–dependent clotting factors: II (prothrombin), VII, IX, and X. Warfarin is the oldest oral anticoagulant in use.[11] People taking warfarin need periodic INR blood tests to determine the adequacy of the anticoagulant therapy. Heparin acts by inactivating clotting factors, primarily thrombin and factor Xa. Low-molecular-weight heparin drugs, such as enoxaparin (Lovenox) and dalteparin (Fragmin), are the most commonly used agents in this category.

Other oral anticoagulants are available that do not require blood tests or restrict diet. These include direct thrombin inhibitors, such as dabigatran (Pradaxa), which acts by inhibiting thrombin and preventing platelet aggregation and thrombus formation by preventing the conversion of fibrinogen to fibrin. Another type of anticoagulant inhibits direct factor Xa inhibitor, examples include rivaroxaban (Xarelto), Apixiban (Eliquis), and Edoxaban (Savaysa).[11]

Antiplatelets. There are a number of groups of agents that work to inhibit platelet aggregation. Oral agents include aspirin and clopidogrel (Plavix). Intravenous agents include abciximab (RePro) and eptifibatide (Integrilin).

Direct thrombin inhibitors. These synthetic agents act as anticoagulants by directly inhibiting thrombin. Examples of drugs in this category are bivalirudin (Angiomax) and argatroban (Acova).[11]

Thrombolytic agents. Thrombolytic agents, such as alteplase (a tissue plasminogen activator), retaplase (Retavase), and tenecteplase (TNKase), are used to dissolve blood clots. These agents act by digesting fibrin in clots and breaking down plasmin and other clotting factors. All of these agents have risks of serious bleeding.[11]

Invasive Procedures

Phlebotomy. Phlebotomy, or the removal of blood, is a common treatment to prevent clots in individuals with polycythemia. The goal of this treatment is to reduce blood volume, blood viscosity, and bone marrow activity. Phlebotomy may be needed as often as every 2 or 3 months.[10]

Thrombectomy. A thrombectomy is the removal of a thrombus from a vessel. This can be accomplished through a catheter placed percutaneously or as an open surgical procedure (e.g., direct arteriotomy or venous thrombectomy) in which the vessel is opened to remove the thrombus.

Filters. Filter devices are used to prevent pulmonary embolism for individuals with clotting disorders who are unable to take anticoagulant agents or have a history of pulmonary emboli. Filters (also known as vena cava interruption devices) are inserted percutaneously through the right femoral vein or right internal veins and floated into the vena cava, where they block blood clots from reaching the pulmonary capillaries.

Nutrition Therapy

Warfarin (Coumadin) is an anticoagulant that acts by interfering with vitamin K–dependent clotting factors (VII, IX, X, and II [prothrombin]). The dosage of this drug is adjusted regularly

to maintain the INR between 2 and 3. Patients taking warfarin should keep their vitamin K intake consistent to maintain the therapeutic effects of the drug. If the dietary intake of vitamin K increases, then the dose of warfarin must be increased as well and vice versa. Sources of vitamin K include green, leafy vegetables such as spinach or kale, mayonnaise, canola oil, and soybean oil.[10]

Positioning

Positioning affects blood flow and comfort. Patients with a deep venous thrombosis (also known as *venous thromboembolism*) in a lower extremity are taught to elevate the affected leg when lying or sitting to facilitate venous return to the heart. By contrast, patients with an arterial thrombus of a lower extremity are taught to position the affected leg in a dependent position to use gravity to improve perfusion to the lower extremities. During the acute phase after a stroke, patients are positioned with the head of the bed elevated at least 30 degrees to facilitate venous blood flow from the brain to help prevent cerebral edema. Positioning for all patients prescribed bed rest includes preventing pressure ulcers by repositioning patients as needed to maintain perfusion in dependent areas. Patients on bed rest should wear sequential compression devices to stimulate venous blood return to the heart.

INTERRELATED CONCEPTS

Concepts that are closely interrelated with clotting are illustrated in Fig. 17.4 and are described further here.

Perhaps the most closely interrelated concept is **Perfusion**. Perfusion of blood through blood vessels is impaired when blood clots slow or stop blood flow. In addition, uncontrolled bleeding and hemorrhage can lead to excessive blood loss. Excessive blood loss can result in a volume of blood that is an insufficient to deliver oxygenated blood to all body tissues.

Clotting is interrelated with **Gas Exchange** because inadequate perfusion is linked to inadequate gas exchange in the peripheral tissues. Also, gas exchange is impaired when pulmonary emboli reduce the amount of pulmonary capillary blood available to carry oxygen from alveoli to cells.

Because the brain is highly dependent on the steady flow of oxygenated blood, **Intracranial Regulation** is also interrelated with clotting. Interruption of cerebral blood flow from either cerebral blood clots or cerebral hemorrhage can lead to brain tissue injury or death. Examples of such problems include stroke, aneurysm, traumatic brain injury, and communicating hydrocephalus.

Individuals with clotting disorders can experience impaired **Mobility** from illness or recovery from surgery. This immobility increases the risk for deep venous thrombosis. Treatment for deep venous thrombosis includes bed rest, which further impairs mobility.

Pain is a common symptom experienced by patients with an arterial thrombus, constriction that impairs perfusion to a lower extremity, or hemorrhage in a joint space. Individuals with venous clots also experience pain.

Another closely interrelated concept is **Patient Education**. Patient education enhances primary prevention strategies and helps patients manage their bleeding or clotting disorders. Individuals with clotting disorders require extensive patient education; likewise, inadequate education can lead to complications.

CLINICAL EXEMPLARS

Multiple conditions contribute to impaired clotting—more than are described in this text. Box 17.2 lists common conditions associated with impaired clotting across the lifespan. Some of these disorders are acute, whereas others are chronic; some are preventable, others are not. Further details about these conditions can be found in medical–surgical and pediatric textbooks.

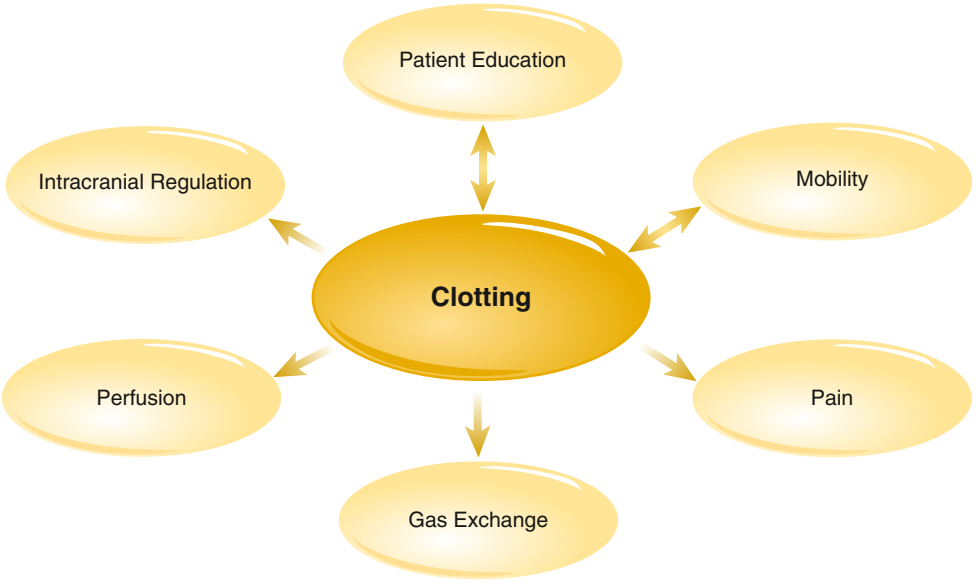

Fig. 17.4 Clotting and Interrelated Concepts.

BOX 17.2 EXEMPLARS OF IMPAIRED CLOTTING

Clotting Disorders

Local

- Arterial embolism
- Venous thromboembolism

Systemic

- Disseminated intravascular coagulation
- Polycythemia

Bleeding Disorders

- Bone marrow depression
- Disseminated intravascular coagulation
- Heparin-induced thrombocytopenia
- Hemophilia A and B
- Immune thrombocytopenia purpura
- Leukemia
- Thrombocytopenia
- Sickle cell disease
- von Willebrand disease

Featured Exemplars

Venous Thromboembolism

This is a condition associated with the formation of a blood clot or thrombus in a vein. Two primary conditions are associated with venous thromboembolism: deep venous thrombosis and pulmonary embolism. Deep venous thrombosis occurs when a blood clot forms within a large deep vein (most commonly in the lower leg, thigh, or pelvis). A pulmonary embolism occurs if the clot or a piece of the clot breaks free, travels through the circulatory system, and lodges in the pulmonary vasculature. An estimated 300,000 to 600,000 individuals each year have deep venous thrombosis, which most commonly affects older adults. Sudden death occurs in an estimated 25% of individuals who experience a pulmonary embolism.[12]

Arterial Embolism

An arterial embolism results when a clot forms in an artery, causing a complete or partial blockage of blood flow. Obstruction of blood flow in an artery is an emergency because of a reduction or loss of oxygenated blood reaching tissues. The severity of the outcome is dependent on the degree, length of time, and location of the obstruction. An arterial thrombosis can occur in any artery, but the three most common sites are the vessels of the heart (leading to cardiac ischemia or infarction), the brain (leading to ischemic stroke), and the vessels in the legs.

Disseminated Intravascular Coagulation (DIC)

DIC is a condition that represents both excessive clotting and bleeding. The primary disorder initiates generalized clotting forming numerous thrombi resulting in multiple organ failure. The abnormal number of thrombi consume and deplete platelets and coagulation factors, leading to hemorrhage. Thrombotic manifestations occur as a result of fibrin or platelet deposits in microvasculature and include cyanosis, paralytic ileus, and kidney damage. Bleeding manifestations include oozing blood, upper gastrointestinal bleed, and hematuria. The causes are numerous, including septicemia, severe trauma, and neoplasms. DIC may affect individuals of any age. Diagnosis is based on assessment findings and a number of different laboratory tests, including platelet count, clotting times, and measurement of degradation products with the D-dimer test.[10]

Hemophilia

Hemophilia represents a group of inherited bleeding disorders caused by a gene mutation leading to the absence or ineffective production of clotting protein factors. The severity of the condition is determined by the level of clotting factor. The two most common types of hemophilia are factor VIII deficiency (hemophilia A) and factor IX deficiency (hemophilia B). This genetic recessive disorder of the X chromosome affects only males, although females can be carriers of the hemophilia gene. It is estimated that approximately 20,000 males in the United States have hemophilia, accounting for approximately 1 in every 5000 male births.[13]

Bone Marrow Suppression

Any suppression of bone marrow activity, also called myelosuppression, can reduce the production of platelets, erythrocytes, and leukocytes. When platelets are low (thrombocytopenia), abnormal bleeding occurs. Bone marrow suppression has multiple causes, including leukemia (discussed next), chemotherapy, aplastic anemia, and heparin-induced thrombocytopenia. Because there are a variety of causes, bone marrow suppression can affect people at any age.

Leukemia

This is a group of malignant diseases affecting the blood and blood-forming tissues of the bone marrow, lymph system, and spleen. Proliferation of abnormal leukocytes prevents the normal production of platelets and erythrocytes, leading to bleeding and anemia. Leukemia is classified by the maturity of the involved cell—acute (immature cells) or chronic (mature cells)—and by the type of leukocytes involved (myelogenous or lymphocytic). Acute myelogenous leukemia has increasing incidence over the age of 60 years. Acute lymphocytic leukemia has a median age of diagnosis of 15 years. Chronic myelogenous leukemia and chronic lymphocytic leukemia increase in incidence with advancing age. Most diagnoses occur after the age of 65 years.[10]

CASE STUDY

Case Presentation

Arthur Rosen is a 78-year-old widower who lives alone. He has a history of atrial fibrillation and has a prescription for warfarin 5 mg once a day. Arthur finished his Coumadin prescription 3 weeks ago and did not have an opportunity to obtain the refill. He was admitted to the hospital for treatment of an ischemic stroke attributable to cerebral emboli. His manifestations were paralysis and anesthesia of the left leg. During the morning assessment, the nurse notices Arthur's left thigh is red and edematous. Arthur tells the nurse his left upper leg feels achy. The circumference of the right leg is 51 cm, whereas the circumference of the left leg is 53 cm. Arthur has no feeling in his left leg. His vital signs are as follows: temperature, 98°F; blood pressure, 140/72 mm Hg; heart rate, 86 beats/min and irregularly irregular; and respiratory rate, 18 breaths/min. Based on these recent changes, the nurse suspects a deep venous thrombosis and notifies the physician of these changes. An ultrasound of the extremity is performed and confirms a deep venous thrombosis. Arthur is prescribed immediate full bed rest, and a new order for intravenous heparin is started until his INR is 2.0 or greater for 24 hours. Also, the nurse notifies the physical therapist of the suspected deep venous thrombosis so that therapy can be rescheduled. The nurse elevates Arthur's left leg on two pillows and does not perform the passive range-of-motion exercises of the lower extremities she had earlier planned.

Case Analysis

This case exemplifies impairment of clotting in several ways. Arthur had a history of atrial fibrillation. This disorder causes stasis of blood in the left atrium, which can cause clot development. These clots can dislodge, allowing emboli to travel to the cerebral circulation. The emboli lodged in the right anterior cerebral artery, impairing blood flow to the right frontal and parietal lobes. This lack of perfusion caused the paralysis and anesthesia of the left leg. Arthur's therapy is bed rest with limited mobility until he becomes stronger. Immobility is a risk factor for the development of thrombi, particularly in the lower extremity.

Case Analysis Questions

1. What risk factors does Mr. Rosen have, predisposing him to a deep vein thrombosis?
2. Referring to Fig. 16.3, which of the interrelated concepts are present in this case?

INR, international normalized ratio.

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT
18

Gas Exchange

Shelly Orr

All cells depend on a consistent supply of oxygen and removal of waste. For this reason, gas exchange is a critical concept for nurses to understand and incorporate into practice. The purpose of this concept presentation is to help nurses acquire an understanding of gas exchange across the lifespan. In practice, nurses promote healthy behaviors in individuals that optimize gas exchange, identify individuals at risk of impaired gas exchange, recognize when individuals are experiencing impairment in gas exchange, and respond with appropriate interventions.

DEFINITION

Gas exchange is defined as *the process by which oxygen is transported to cells and carbon dioxide is transported from cells.* This normal physiological process requires interaction among the neurologic, respiratory, and cardiovascular systems. The lungs deliver oxygen to the pulmonary capillaries, where it is carried by hemoglobin to cells. After cellular metabolism, carbon dioxide is carried in hemoglobin to the lungs, where it is exhaled. Thus, adequate functioning of these systems is essential for optimal gas exchange. Several other terms are important as they relate to this concept. *Ischemia* refers to insufficient flow of oxygenated blood to tissues that may result in hypoxemia and subsequent cell injury or death. *Hypoxia* is insufficient oxygen reaching cells, whereas *anoxia* is the total lack of oxygen in body tissues. *Hypoxemia* is reduced oxygenation of arterial blood.[1]

SCOPE

The concept of Gas Exchange and problems associated with impaired gas exchange represent a variety of physiologic processes. Variations in gas exchange are seen among individuals across the lifespan, with multiple causative factors and a wide range of effects and duration. From the broadest perspective, the scope of gas exchange represents a spectrum of optimal gas exchange to no gas exchange (Fig. 18.1). The more gas exchange is impaired, the more compromised the body becomes as a result of insufficient oxygen (hypoxia). Cessation of gas exchange leads to anoxia.

NORMAL PHYSIOLOGICAL PROCESS

The process of gas exchange is presented in Fig. 18.2. Breathing is involuntary because changes in ventilation rate and volume are stimulated and regulated automatically by the nervous system to maintain arterial blood gas levels within normal ranges. Chemoreceptors in the medulla sense carbon dioxide levels, and when carbon dioxide concentration is elevated, these receptors transmit impulses to the diaphragm and intercostal muscles to contract. As the diaphragm contracts, negative pressure pulls in atmospheric air, which is approximately 21% oxygen. The nose warms and humidifies the air, which flows to alveoli through patent airways (trachea and bronchi) (Fig. 18.3). Alveolar walls are lined with a single layer of epithelial cells, called type I alveolar cells, that provide structure. In between these type I cells are thicker type II alveolar cells that produce surfactant—a lipoprotein that coats the inner surface of alveoli to keep them open. The high pressure of oxygen in alveoli causes it to diffuse into pulmonary capillaries, where it dissolves into the plasma and attaches to hemoglobin in erythrocytes to be transported (perfused) to cells. Oxygen dissolved in plasma is measured clinically by the partial pressure of oxygen in the artery, or PaO_2. Oxygen attached to hemoglobin is measured clinically

Fig. 18.1 Scope of Concept: Gas Exchange.

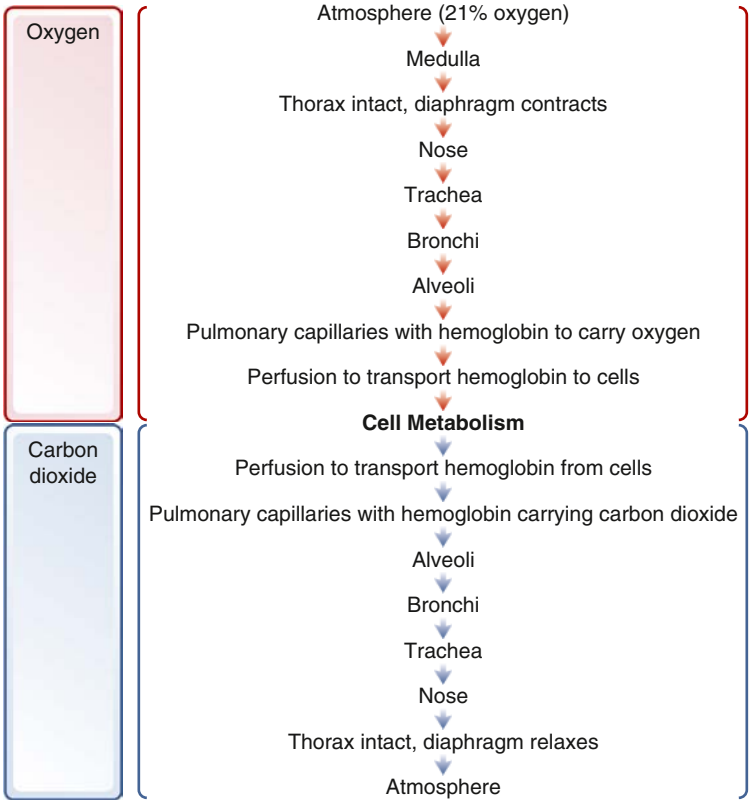

Fig. 18.2 Process of Gas Exchange.

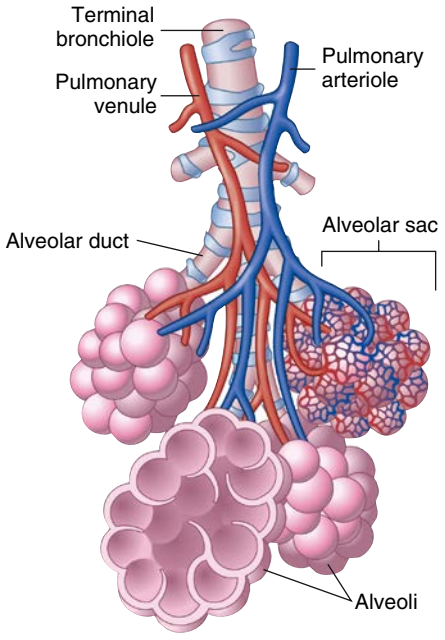

Fig. 18.3 Alveoli and Related Structures. (From Patton KT, Thibodeau GA: Human body in health and disease, ed 7, St Louis, 2018, Elsevier.)

by the saturation of arterial hemoglobin or oxygen saturation (SaO_2). At the cellular level, oxygen is released from hemoglobin, referred to as *hemoglobin desaturation*. Oxygen dissolves in plasma and diffuses into the interstitial space, and then diffuses into cells to be used in metabolic processes.[1]

Carbon dioxide, a by-product of cellular metabolism, is transported to the atmosphere in the reverse order, which lowers the arterial carbon dioxide level. The high pressure of carbon dioxide in cells causes it to diffuse into plasma, which is measured clinically by the partial pressure of carbon dioxide in the artery, or $PaCO_2$. When $PaCO_2$ decreases, it turns off signals to the medulla to initiate inhalation until the carbon dioxide level rises again to repeat the gas exchange process.

The term *gas exchange* can be misinterpreted because the word "exchange" can mean "swap, substitute, or trade." However, as described by Dalton's law of partial pressures, the pressure exerted by each gas is independent of the pressure exerted by other gases. Oxygen diffuses from the alveoli to the pulmonary capillaries because the pressure of oxygen in the alveoli is higher than the pressure of oxygen in the capillaries. Gases diffuse from areas of high concentration to areas of low concentration.[1] The belief that oxygen diffuses based on the diffusion of carbon dioxide is incorrect. These two gases are independent; they are not exchanged with each other.

Age-Related Differences

Babies born after 36 weeks of gestation have sufficient surfactant to prevent alveoli from collapsing after every exhalation. Infants are obligate nose breathers until approximately 3 months. Should their nasal passages become occluded, they may have difficulty breathing. Sneezing occurs commonly as a way to clear the nose. Respiratory patterns for newborns may be irregular, with brief pauses between breaths of no more than 10 to 15 seconds.[2]

For older adults, diminished strength of respiratory muscles reduces the maximal inspiratory and expiratory force. This may result in a weaker cough. The alveoli become less elastic and more fibrous, which causes dyspnea more frequently because of reduced diffusion across the alveolar-capillary membrane. Older adults experience a reduction in erythrocytes, which increases their risk of anemia.[2]

VARIATIONS AND CONTEXT

Variations in gas exchange may occur in individuals across the lifespan, with a wide range of effects. Problems with gas exchange may occur in premature infants (born before 36 weeks of gestation when lungs are not fully developed) and among older adults who experience physiologic changes from aging and the effects of chronic conditions or smoking. Changes in gas exchange can be temporary, long-term, or permanent. Disorders that lead to changes in gas exchange include acute illnesses, such as asthma or pneumonia, and chronic disorders, such as chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis. Conditions that specifically involve gas exchange include conditions of the neurologic (including those affecting the brain or spinal cord), cardiovascular (including blood flow in heart, arteries, and veins), and hematologic (including anemia) body systems. Conditions in these body systems can arise from congenital defects, genetic conditions, injury, inflammation, infections, and malignant neoplasms. The three broad categories that represent problems associated with this concept are ventilation, transport, and perfusion.

Ventilation

Ventilation is the process of inhaling oxygen into the lungs and exhaling carbon dioxide from the lungs. Ventilation may be impaired by the unavailability of oxygen from high altitudes or any disorder affecting the conducting airways, lungs, or respiratory muscles. Impaired ventilation may occur in the following situations:

- Inadequate bone, muscle, or nerve function to move air into the lungs, such as a rib fracture that reduces inhalation due to pain, muscle weakness that prevents full thoracic expansion, or cervical spinal cord injury that limits movement of the diaphragm
- Narrowed airways from bronchoconstriction (e.g., in asthma) or from obstruction (e.g., in chronic bronchitis or cystic fibrosis)
- Poor gas diffusion in the alveoli, such as in pulmonary edema, acute respiratory distress syndrome, or pneumonia

Transport

Transport refers to the availability of hemoglobin and its ability to carry oxygen from alveoli to cells for metabolism, and to carry carbon dioxide produced by cellular metabolism from cells to alveoli to be eliminated. *Altered transport of oxygen* occurs when an insufficient number or quality of erythrocytes is available to carry oxygen or when the amount of hemoglobin in the blood is low. This occurs when patients have anemia for any reason. Blood loss from acute or chronic causes reduces the number of erythrocytes, thus making hemoglobin unavailable to carry oxygen. Finally, the destruction of erythrocytes occurs in hemolytic anemias (when the spleen destroys these cells prematurely, such as in sickle cell crisis).

Perfusion

Perfusion refers to the ability of blood to transport oxygen-containing hemoglobin to cells and return carbon dioxide–containing hemoglobin to the alveoli. Inadequate or impaired perfusion can be caused by decreased cardiac output, as well as by thrombi, emboli, vessel narrowing, vasoconstriction, or blood loss. (See Concept 16, Perfusion.)

CONSEQUENCES

When gas exchange is compromised for any reason, a reduction or cessation of oxygen occurs that affects the cells, triggering a number of physiological problems depending on the extent of impairment.

With mild impairment, an individual often experiences fatigue. This symptom actually helps the body compensate through rest, thus reducing oxygen demand. Heart rate and respiratory rate may also increase in an attempt to increase oxygen delivery to cells. When impaired gas exchange becomes more pronounced, the reduction of oxygen at the cellular level leads to reduced mitochondrial respiration and oxidative metabolism. Carbon dioxide transported from the cells to the alveoli leads to a buildup of acid. Thus, when the underlying problem is associated with ventilation, respiratory acidosis may result. Metabolic acidosis can occur if the underlying problem is associated with transport or perfusion. If the impairment is prolonged or severe, cellular ischemia and necrosis can occur. A complete cessation of gas exchange occurs when breathing or perfusion stops, and quickly results in death.

RISK FACTORS

Because adequate gas exchange is required for life, all individuals—regardless of age, sex, race, or socioeconomic status—are potentially at risk of gas exchange impairment. Nurses need to recognize, however, that some individuals are at greater risk for impairment. Some of these risk factors are controllable due to lifestyle behaviors, whereas others are not.

Populations at Risk

Populations at greatest risk are infants, young children, and older adults. Infants are at risk because they have fetal hemoglobin. Fetal hemoglobin is present for the first 5 months of life and results in shortened survival of erythrocytes, causing physiological anemia by age 2 or 3 months. Contributing to anemia at approximately 6 months of age is the lower level of hemoglobin caused by gradually diminishing maternal iron stores.[3] Infants and young children are at risk for impaired gas exchange because they have less alveolar surface area for gas exchange, as well as narrow branching of peripheral airways that are easily obstructed by mucus, edema, or foreign objects.[3]

Older adults are at risk for impaired gas exchange because of anatomic and physiological changes that occur with advanced age. The chest wall becomes stiffer with loss of elastic recoil. Respiratory muscles become weaker, reducing the effectiveness of coughing, which is normally a protective mechanism to prevent aspiration. Additional expected changes are dilation of alveoli, decreased surface area for gas diffusion, and decreased pulmonary capillary network. Finally, the ability to initiate an immune response to infection is decreased in older adults.[1]

Individual Risk Factors

A number of personal risk factors are linked to impairment in gas exchange. Nonmodifiable risk factors include age (as described under Populations at Risk), air pollution, and allergies. *Tobacco use* is the single most preventable cause of death and disease in the United States and is the most significant risk factor for impaired gas exchange. Boxes 18.1 and 18.2 present data about tobacco use. The percentages in each of the categories in Box 18.2 have decreased over the last few years, indicating that fewer people use tobacco. Risk for aspiration is increased during an altered state of consciousness, such as from a chemical alteration (e.g., alcoholism, drug overdose, and anesthesia) or from a neurologic disorder (e.g., head injury, seizure, and stroke). Patients requiring tracheal intubation are at risk because protective mechanisms for alveoli are bypassed. Bed rest and prolonged immobility reduce thoracic expansion, which can increase the risk for atelectasis and pneumonia. Chronic diseases, such as cystic fibrosis, COPD, or heart failure, increase risk because of mucus and fluid accumulation in airways and alveoli. Immunosuppression alters the body's natural ability to fight infection, whether it is caused by a systemic disorder (e.g., aplastic anemia), a cancer (e.g., leukemia), or a treatment regimen (e.g., cancer chemotherapy).

ASSESSMENT

Nurses gather data from the patient's history, physical examination, and diagnostic test results. Assessment of gas exchange involves recognizing indications of adequate and inadequate ventilation, transport, and perfusion. Adequate ventilation is apparent when

- Breathing is quiet and effortless at a rate appropriate for age.
- Oxygen saturation (SaO_2) is between 95% and 100%.
- Skin, nail beds, and lips are appropriate colors for the patient's race.
- Thorax is symmetric with equal thoracic expansion bilaterally.
- Spinous processes are in alignment; scapulae are bilaterally symmetric.
- Anteroposterior (AP) diameter of the chest is approximately one-half the lateral diameter (or approximately a 1:2 ratio of AP to lateral diameter).
- Trachea is midline.
- Breath sounds are clear bilaterally.[2]

BOX 18.1 Use of Tobacco Products Among Middle and High School Students in 2020

Percentage of Adolescents Using a Tobacco Product (Self-Reported, Current Past 30-Day Use)

- High school students = 23.6%
- Middle school students = 6.7%

Types of Tobacco Products Used by Adolescents

E-Cigarettes

- High school students = 19.6%
- Middle school students = 4.7%

Cigarettes

- High school students = 4.6%
- Middle school students = 1.6%

Cigars

- High school students = 5.0%
- Middle school students = 1.5%

Smokeless Tobacco

- High school students = 3.1%
- Middle school students = 1.2%

From Centers for Disease Control and Prevention. (2020). Tobacco product use among middle and high school students—United States, 2020. *Morbidity and Mortality Weekly Report,* 69 (50), 1881–1888.

History

Baseline History

When collecting subjective data from patients, nurses ask about lifestyle behaviors, including diet, exercise, and tobacco use. Nurses ask about patients' work and home environments to identify potential respiratory irritants. Also, patients are asked about any chronic diseases or allergies that may affect the respiratory system. Nurses ask patients about medications they take, both prescription and over-the-counter, and the reason each medication is taken as well as its efficacy.[2]

Problem-Based History

The following symptoms are often reported by individuals experiencing gas exchange impairment: cough, shortness of breath, and chest pain with breathing. When a symptom is reported, a symptom analysis is conducted.

Cough. When a cough is reported or observed, the patient should be asked if the cough causes fatigue or interferes with sleep. The patient should also be asked if the cough is productive or nonproductive. Inquire about the color and consistency of productive coughs. Question the patient about factors that aggravate and alleviate the cough as well as any self-treatment measures taken to relieve the cough. Also, the patient should be asked about other symptoms that accompany the cough, such as fever or shortness of breath.[2]

Shortness of breath. Patients may report they have had to stop climbing stairs to "catch their breath." Others may report having to sleep sitting up or using several pillows to prop themselves up during the night. Lightheadedness may be reported as a result of inadequate oxygen transport to the brain. Inquire about

BOX 18.2 Characteristics of Adults Who Smoke[a]

By Sex
- 14.1% of men
- 11.0% of women

By Age
- 7.4% of ages 18 to 24 years
- 14.1% of ages 25 to 44 years
- 14.9% of ages 45 to 64 years
- 9.0% of ages 65 years or older

By Race/Ethnicity
- 27.1% of non-Hispanic American Indian individuals/Alaska Native individuals
- 19.5% of non-Hispanic individuals from other racial groups (other single and multiple races)
- 8.0% of non-Hispanic Asian individuals
- 14.4% of non-Hispanic Black individuals
- 13.3% of non-Hispanic White individuals
- 8.0% of Hispanic individuals

By Education
- 32% with a General Educational Development (GED) certificate
- 21.5% with some high school (no degree)
- 17.6% with a high school diploma
- 14.4% with some college (no degree)
- 12.7% with an Associate's degree
- 5.6% with an undergraduate degree
- 3.5% with a graduate degree

By Annual Household Income
- 20.2% with an annual household income less than $35,000
- 14.1% with an annual household income $35,000 to $74,999
- 10.5% with an annual household income $75,000 to $99,999
- 6.2% with an annual household income $100,000 or greater

[a] Statistics based on every 100 adults.
From Centers for Disease Control and Prevention. (2020). *Current cigarette smoking among adults in the United States*. Retrieved from http://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm

what precipitated the shortness of breath and if it occurs during inhalation or exhalation, or both. The patient should be asked which factors aggravate and alleviate the dyspnea and also if there are other symptoms, such as cough, chest pain, or swelling of the feet and ankles.[2]

Chest pain with breathing. The patient should be asked which activities are associated with the chest pain, when it occurs, and how long the pain lasts. Inquire if the onset of chest pain was gradual or sudden, and ask for a description of the pain, such as sharp or dull, pain radiation, and severity.[2]

Examination Findings

Vital Signs

Inadequate gas exchange causes changes in vital signs such as an increase in respiratory rate, decrease in SaO_2, increase in heart rate, and increase in temperature. An increased respiratory rate may be due to increased work of breathing. The SaO_2 value may drop below 95% when oxygen is not being transported by hemoglobin to cells. Tachycardia may occur from anxiety caused by not being able to breathe well, from anemia, or from compensatory efforts to increase perfusion. Temperature may be elevated because of an infection, such as pneumonia or respiratory syncytial virus.

Inspection

If a patient is having difficulty breathing, the nurse may notice the patient assuming a position to ease the work of breathing (e.g., sitting leaning forward). Patients with impaired gas exchange often appear anxious because of the sensation of not getting enough air or a feeling of suffocation. Low SaO_2 may impair mentation as a result of lack of adequate oxygen supply to the brain. Patients may use accessory muscles on inspiration to help get air into the lungs. They may use pursed-lip breathing on exhalation to keep airways open longer. The skin and lips may appear pale because of anemia or hypoxemia. A late sign of hypoxemia is cyanosis. Clubbing of nails develops in patients with chronic hypoxic disorders such as cystic fibrosis or COPD. When patients develop a barrel chest from air trapped in alveoli from emphysema, their AP-to-lateral diameter ratio changes from a normal of 1:2 to 1:1. The thorax may be asymmetric, with unequal thoracic expansion unilaterally attributable to pneumothorax. Scoliosis is a curvature of vertebrae that creates asymmetric expansion of the thorax as well as malalignment of spinous processes and scapulae. The trachea shifts from midline away from the lung that is experiencing a tension pneumothorax.[2]

Additional assessment findings commonly noted in infants and young children with inadequate gas exchange are flaring of the nares, chest wall retractions on inspiration, grunting on inspiration, cyanosis around the lips when sucking, and the need to stop during feeding to breathe.[3]

Auscultation

During auscultation, narrowed bronchi may produce expiratory and/or inspiratory wheezing or stridor. Mucus or secretions in the bronchi may create rhonchi, and fluid in alveoli may generate crackles.[2]

Diagnostic Tests

There are a number of diagnostic tests associated with gas exchange that are used to assess for impairment.

Laboratory Tests

Arterial blood gases. Arterial blood gases (ABGs) reveal measurements of pH, oxygen, carbon dioxide, and bicarbonate concentrations in arterial blood. They are used to detect respiratory acidosis and alkalosis. Respiratory acidosis develops during hypoventilation when carbon dioxide is retained, such as in patients with COPD. Respiratory alkalosis develops during hyperventilation when excessive carbon dioxide is exhaled, such as during anxiety or hysteria. Measures of ABGs include

- pH is inversely proportional to the actual hydrogen ion concentration. Normal values are between 7.35 and 7.45. A pH

value less than 7.35 indicates acidosis, and a value greater than 7.45 indicates alkalosis.[4]

- SaO_2 is an abbreviation for *saturation of arterial oxygen* and represents the percentage of arterial hemoglobin that is saturated with oxygen. This value accounts for approximately 97% of arterial oxygen. The normal value for adults is 95% to 100% and for newborns 40% to 90%.[4]
- PaO_2 is an abbreviation for *partial pressure of arterial oxygen* and represents the pressure of oxygen dissolved in arterial blood. This value accounts for approximately 3% of oxygen. The normal value for adults is 80 to 100 mm Hg and for newborns 60 to 70 mm Hg.[4]
- $PaCO_2$ is an abbreviation for *partial pressure of arterial carbon dioxide* and represents the pressure of carbon dioxide dissolved in arterial blood. The normal value for adults is 35 to 45 mm Hg and for children younger than age 2 years is 26 to 41 mm Hg. The CO_2 level and pH are inversely proportional; thus, when CO_2 levels increase, pH decreases, indicating acidosis. When CO_2 levels decrease, pH increases, indicating alkalosis. $PaCO_2$ is controlled primarily by the lungs; the faster and more deeply one breathes, the more CO_2 is blown out, leading to a reduction in $PaCO_2$ levels.[4]
- HCO_3 is an abbreviation for bicarbonate and represents most of the carbon dioxide in the blood. Normal values are 22 to 26 mEq/L. There is a direct proportional relationship between HCO_3 concentration and pH; thus, when HCO_3 concentration is greater than normal, pH increases, indicating alkalosis. When the HCO_3 concentration is less than normal, pH decreases, indicating acidosis. The kidneys compensate for primary respiratory acid-base alterations. For example, in respiratory acidosis, the kidneys compensate by retaining HCO_3 in an attempt to regain acid-base balance. However, in respiratory alkalosis, the kidneys compensate by excreting HCO_3 in an attempt to regain acid-base balance.[4]

Complete blood count. The complete blood count (CBC) includes red blood cell (RBC) count, hemoglobin (Hb or Hgb) concentration, hematocrit (Hct) percentage, and white blood cell (WBC) count:

- RBC count determines the number of circulating RBCs in 1 mm^3 of venous blood. Because each RBC carries hemoglobin, the RBC count provides an indirect measure of the oxygen-carrying capacity of the blood. Patients who have anemia have fewer red blood cells, which reduces the patient's oxygen-carrying ability.
- Hb measures the concentration of Hb in the blood, reflecting the oxygen and carbon dioxide transport capability. Hb reflects the number of red blood cells in the blood.
- Hct is the percentage of blood volume that is composed of red blood cells. The hematocrit level closely reflects the hemoglobin level and red blood cell count.
- WBC count is the number of leukocytes in blood. The WBC differential measures the percentage of each leukocyte (e.g., neutrophils, eosinophils, basophils, or monocytes) contained within the total number of white blood cells. Elevations in total WBC count occur when there is inflammation, and often the inflammation is due to infection. Decreases in WBC count occur with certain cancers and as an adverse effect of chemical or radiation therapy to treat cancer. Patients with low WBC counts are at risk for newly acquired infection because the immune system is unable to respond optimally.[4] The WBC differential is helpful in suggesting a generalized cause of the abnormal value. For example, elevated neutrophils indicate an acute inflammation, whereas increased monocytes indicate a chronic infection. Eosinophils are elevated during allergies.

Sputum examination. Studying sputum specimens can help in the diagnosis of respiratory disorders. Culture and sensitivity are performed on a single specimen to detect bacteria and determine which antibiotic is most effective. Gram stain of sputum distinguishes gram-positive from gram-negative bacteria. Testing a series of three early morning sputum samples for acid-fast bacillus is diagnostic for tuberculosis. A single sputum specimen for cytologic examination is performed to detect a pulmonary malignancy.[5]

Skin tests. Mantoux skin test is used to detect tuberculosis. A positive reaction to the skin test indicates that patients have developed antibodies to *Mycobacterium tuberculosis.* Allergies detected by skin tests may indicate causes of bronchoconstriction. The sweat chloride test screens for cystic fibrosis, which produces high levels of chloride in the sweat.

Pathologic analysis. Tissue from the lungs or bronchus may be taken for pathologic analysis, particularly if a malignant tumor is suspected.

Radiologic Studies

Chest x-ray. Chest x-ray films are very useful in detecting impaired ventilation because they provide visualization of the lungs, ribs, clavicles, vertebrae, heart, and major thoracic vessels. They are useful in identifying foreign bodies, infiltrations in pneumonia, tubercles in tuberculosis, tumors in cancer, or edema. In patients with COPD, chest x-rays show the flat diaphragm and barrel chest configuration of ribs and vertebrae. Also, chest x-rays can identify pleural effusion, pneumothorax, hemothorax, or empyema.[5]

Computed tomography. Computed tomography (CT) scans of the chest produce three-dimensional images of the lungs and are useful for detecting pulmonary densities, space-occupying tumors, and pulmonary emboli.[5]

Magnetic resonance imaging. Magnetic resonance imaging (MRI) scans of the chest are useful for in-depth examinations of lesions (i.e. lung cancer) that are difficult to assess by CT scans.

Ventilation–perfusion scans. Ventilation–perfusion (V/Q) scans use radioactive particles to diagnose disorders involving both perfusion and ventilation. Radioactive particles are injected into peripheral veins to detect impaired perfusion to the lungs. Also, inhaled radioactive particles are used to detect impaired lung function. This scan is used to diagnose pulmonary emboli.[5]

Positron emission tomography. A positron emission tomography (PET) scan uses an intravenous injection of radioactive chemical compounds to distinguish benign from malignant pulmonary nodules.[5]

Pulmonary Function Studies

Pulmonary function tests assess the presence and severity of diseases in large and small airways. A spirometer measures the

volume of air moving in and out of the lungs and then calculates the lung capacities.[5] One example of its use is for patients with asthma. As their bronchoconstriction worsens, they exhale less air. This finding is reported as decreased forced expiratory volume.

Pulmonary function tests are also used to distinguish between obstructive and restrictive pulmonary diseases. Because air trapping increases for patients with obstructive lung disease, such as cystic fibrosis or COPD, more air remains in their lungs, which is reflected as an increase in reserve volume. Obstructive lung diseases impair patients' ability to get air out of the lungs. By contrast, patients may develop restrictive lung diseases from intrapulmonary or extrapulmonary causes. Intrapulmonary causes include pulmonary fibrosis or empyema. Extrapulmonary causes include chest wall trauma or cervical spinal cord injury. Restrictive lung diseases impair the patient's ability to get air into the lungs, as reflected in a decreased tidal volume.

Endoscopy Examination

Bronchoscopy is an endoscopic examination in which a flexible fiber-optic bronchoscope is extended through the bronchi for the purpose of diagnosis, specimen collection, or tissue biopsy.[5]

CORE COMPETENCIES

Gas Exchange

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to gas exchange.
- Using a person-centered approach, conduct a clinically relevant assessment, recognizing actual or potential health problems, related to gas exchange.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to gas exchange for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to gas exchange.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to gas exchange.
- Demonstrate clinical judgment founded on broad knowledge of gas exchange.

CLINICAL MANAGEMENT

Clinical management related to gas exchange includes health promotion and the management of emerging or present conditions that compromise gas exchange. The ultimate goal is to optimize gas exchange.

Primary Prevention

Primary prevention includes measures to promote health and prevent development of disease. Several measures prevent conditions known to impair gas exchange.

Infection Control

One of the simplest primary prevention measures is infection control. Proper hand hygiene helps to prevent respiratory tract infections. All individuals should be taught the importance of hand hygiene and proper hand-washing technique; in addition, individuals should be instructed to clean surfaces that are frequently touched, such as doorknobs and countertops. Coughing or sneezing into a tissue or into the elbow or sleeve reduces the particles delivered into the air. Avoiding large groups of people reduces the airborne transmission of microorganisms.

Smoking Cessation

Smoking cessation is important for both primary prevention, discussed here, and an intervention to treat disease. Goals related to tobacco use include reducing both tobacco use and initiation by adolescents and adults, adopting policies and strategies to increase smoke-free areas (i.e. worksites, restaurants), and increasing Medicaid coverage of evidence-based treatments to help people quit using tobacco.[6]

Nicotine in tobacco products is a psychoactive drug that produces dependence and is the most common form of chemical dependence in the United States. The American Lung Association and American Cancer Society have resources to help patients stop smoking.[7,8] Quitting smoking is difficult and may require multiple attempts. Smokers often report lack of success in smoking cessation because of stress, weight gain, and withdrawal symptoms, which include irritability, anxiety, difficulty concentrating, and increased appetite.

People who are successful at smoking cessation greatly reduce their risk for disease and premature death. In addition to nicotine, cigarette smoke contains at least 250 chemicals known to be toxic or carcinogenic.[9] Health benefits of smoking cessation include reducing the risk for lung and other cancers, and reducing the risk for coronary heart disease, stroke, peripheral vascular disease, and COPD. When women in their reproductive years quit smoking, they reduce the risk for infertility. Smoking cessation in women who are pregnant reduces the risk of delivering a low-birth-weight infant.[9]

Immunizations

Immunizations prevent infection by bacteria or viruses, such as diphtheria, Haemophilus influenzae type b (Hib), influenza, COVID-19, measles, pneumococcal, pertussis, and rubella. Schedules for these immunizations from infancy to adulthood are found on the Centers for Disease Control and Prevention website.[10]

Preventing Postoperative Pulmonary Complications

After a surgical procedure, patients are encouraged to breathe deeply and cough at least every 2 hours and/or use an incentive spirometer to prevent pneumonia and atelectasis. This device encourages deep breathing for patients and measures the air inhaled as an outcome indicator that is useful for nursing assessment.

Preventing deep vein thrombosis is essential for all patients who are less active than usual so that pulmonary emboli are prevented. This includes patients after a surgical procedure or those whose disease process prevents them from ambulating as much as usual. One intervention is to subcutaneously administer an anticoagulant to reduce clotting of platelets. Another

intervention is to apply elastic stockings to the legs or use intermittent compression devices to the lower legs to prevent venous stasis. A third intervention is to encourage ambulation as soon as possible.

Secondary Prevention (Screening)

Secondary prevention includes screening and early diagnosis and prompt treatment of existing health problems. Its purpose is to shorten the duration and severity of consequences. There are few routine screenings for problems associated with gas exchange. A Mantoux skin test may be administered to individuals who have exposure risks to tuberculosis.

Collaborative Interventions

Smoking Cessation

Although smoking cessation is typically considered primary prevention (to prevent respiratory illness), it is also considered an important intervention strategy among individuals who have a disease process because smoking can exacerbate respiratory disease.

Pharmacotherapy

Pharmacotherapy plays a very important role in managing individuals with impaired gas exchange. Agents can be used to open upper and lower airways to improve gas exchange by dilating airways, reducing edema, increasing a cough's effectiveness, and killing or limiting the growth of microorganisms. Depending on the pharmacologic agent, these drugs are administered through a number of routes, including oral, intravenous, and inhalation through inhalers or nebulizers (aerosol). Descriptions of general classifications of agents are presented next; consult a pharmacology textbook for further information about specific agents.

Drugs that affect upper airways. Antihistamines relieve symptoms of sneezing, rhinorrhea, and nasal itching experienced in allergic rhinitis. They are more effective when taken prophylactically. Antihistamines block the histamine$_1$ receptors to cause vasoconstriction and decreased capillary permeability of small arterioles and venules.[11]

Decongestants relieve congestion in passageways and sinuses. Intranasal glucocorticoids exert an antiinflammatory effect to prevent or suppress major symptoms of allergic rhinitis such as congestion, rhinorrhea, sneezing, nasal itching, and erythema. Sympathomimetics act as decongestants by activating the α_1-adrenergic receptors on nasal blood vessels to cause vasoconstriction that shrinks edematous membranes, thereby reducing nasal drainage.[11]

Lower airway bronchodilators. Glucocorticoids reduce bronchial hyperreactivity that occurs in asthma by suppressing inflammation. Specifically, they decrease synthesis and release of inflammatory mediators such as leukotrienes, histamine, and prostaglandins; decrease infiltration of inflammatory cells such as eosinophils and leukocytes; and decrease edema of airway mucosa. They may be given by inhalation, orally, or intravenously.

Sympathomimetic agents are β_2 agonists that act on these receptors to relax the bronchial smooth muscle of the lung to relieve bronchospasm. These agents stimulate the normal sympathetic nervous system to open airways.[11]

Anticholinergics improve lung function by blocking muscarinic receptors in the bronchi, causing bronchodilation. These agents block the normal parasympathetic nervous system so it cannot stimulate constriction of airways.[11]

Agents to help cough up mucus. Two types of agents assist in the removal of mucus. Mucolytics react directly with the mucus to make it more liquid. Expectorants cause the cough to be more productive by stimulating the flow of respiratory tract secretions.

Cough suppressants. Coughing is a protective mechanism and is useful to expectorate sputum. However, when coughing is chronic and nonproductive, it may prevent sleep or tire the patient, making cough suppression therapeutic. Most antitussives act within the central nervous system.

Antimicrobials. Respiratory tract infections are treated with antimicrobials to kill or limit growth of microorganisms.

Agents to aid smoking cessation. Many products available as first-line treatments for smoking cessation are used as nicotine replacement therapy. They are available in gum, lozenge, patch, inhaler, or nasal spray forms. Nicotine replacement therapy allows smokers to substitute a drug source of nicotine for the nicotine in cigarettes and gradually withdraw the replacement nicotine to wean off nicotine completely.[11]

Oxygen Therapy

Delivery of humidified oxygen is a cornerstone of gas exchange intervention. Nurses collaborate with respiratory therapists to supply patients with oxygen and teach them how to use oxygen at home when applicable. Oxygen therapy is provided through a variety of delivery mechanisms when patients require more than 21% oxygen. A standard nasal cannula is used to deliver 24% oxygen (at flow rates of 1 L/min) to 44% oxygen (at flow rates of 6 L/min) through plastic nasal prongs. This is a safe and simple method that can be used for long-term therapy. For greater oxygen needs, high-flow nasal cannulas can deliver up to 60 L/min. The use of a cannula allows patients to eat, talk, and cough while wearing this device. Patients whose pulmonary disease causes retention of carbon dioxide, such as those with COPD, should not use oxygen levels greater than 3 L/min unless necessary.[5] Their bodies have adjusted to chronically high levels of carbon dioxide (hypercapnia) so that carbon dioxide no longer acts as the stimulant to breathe. For these patients, low blood oxygen levels become the stimulant to initiate breathing. Thus, giving these patients oxygen can eliminate their stimulus to breathe, causing hypoventilation and, if prolonged, death.

Oxygen therapy can be provided through a simple face mask that covers the patient's nose and mouth. This mask delivers between 35% and 50% humidified oxygen at flow rates of 6 to 12 L/min and is often used for short-term therapy because of its uncomfortable fit.[5] Partial or nonrebreathing

masks are used for short-term therapy when patients need higher levels of humidified oxygen between 60% and 90% at flow rates of 10 to 15 L/min. Oxygen flows into a reservoir bag and mask during inhalation. To attain these high levels of oxygen, the mask must fit snugly over the nose and mouth and may be uncomfortable.[5] Venturi masks can deliver precise, high-flow rates of humidified oxygen. These lightweight, cone-shaped devices are fitted to the face and are able to deliver 24%, 28%, 31%, 35%, 40%, and 50% oxygen. These masks are often used to deliver low-flow, constant oxygen concentrations to patients in need.[5] A tracheostomy collar is available to provide humidified oxygen to patients with tracheostomy tubes.

Airway Management and Breathing Support

Patients with an acute disorder causing impaired gas exchange may need airway support. Before arrival of the emergency team, the nurse may insert a nasopharyngeal or oropharyngeal airway to maintain or open the patient's airway.

Patients requiring high-flow rates of oxygen should be monitored closely since more advanced interventions may be needed such as continuous positive airway pressure (CPAP), bilevel positive airway pressure (BiPAP), or intubation with mechanical ventilation. CPAP and BiPAP are both noninvasive mechanical methods to support ventilation rather than invasive methods (i.e. intubation with mechanical ventilation).[5] Both CPAP and BiPAP deliver positive airway pressure through a tight-fitting mask that is connected to a hose and small portable machine; BiPAP allows for variations in pressure during inspiration and expiration.

Patients needing intubation will require insertion of an endotracheal or tracheostomy tube. Using these devices, precise quantities of humidified oxygen up to 100% can be delivered to the trachea and bronchi. When breathing support is needed, the patient's respiratory rate and volume can be controlled by a ventilator.

Chest Physiotherapy and Postural Drainage

Chest physiotherapy and postural drainage are performed for the purpose of loosening and moving secretions into large airways where they can be expectorated. Chest physiotherapy includes percussion (cupping and clapping) and vibration to loosen secretions. Postural drainage involves positioning the patient in specific positions (e.g., head down, on left and right sides, and supine and prone) to use the benefit of gravity to remove secretions after they are loosened from specific segments of the lungs. Patients with cystic fibrosis use this procedure frequently to help remove the thick secretions formed by their disorder.

Invasive Procedures

There are a number of invasive therapeutic interventions. The nurse provides care for patients during and after the procedures.

Chest tubes. Chest tubes are placed in the pleura to remove air (pneumothorax) and/or blood (hemothorax) so that the lungs can be reexpanded after thoracic surgery or trauma. Nurses monitor the dressings around these tubes, amount and appearance of drainage from chest tubes, and functioning of drainage collection devices.

Thoracentesis. Thoracentesis is a procedure to relieve a pleural effusion by inserting a needle into the pleural space to remove fluid. Nurses assist physicians with this procedure and monitor the patient's vital signs, lung sounds, and pain level.

Bronchoscopy. Bronchoscopy is a procedure that can be diagnostic or therapeutic. The procedure involves insertion of a bronchoscope through the trachea into bronchi. The diagnostic effect is directly visualizing the airway or taking tissue samples for biopsy. The therapeutic effects can include removing foreign objects and suctioning mucous plugs from airways or airway lavage. Airway patency can also be accomplished using laser therapy, electrocautery, cryotherapy, and stents placed through a bronchoscope.[5]

Nutrition Therapy

Nutrition therapy is needed to ensure adequate energy is provided for the increased work of breathing and to support the immune system. High-protein, high-calorie, nutritious foods and drinks meet the needs of these patients. Small meals are advised for patients who become dyspneic while eating. For patients with a productive cough, oral care should be offered before meals to reduce any lingering taste of sputum.[5]

Positioning

Two positions are important interventions for patients with impaired gas exchange. The first position is *sitting up.* Patients with acute or chronic impaired gas exchange breathe more easily in high-Fowler position, Fowler position, or semi-Fowler position. These positions use gravity to move the diaphragm away from the lungs to reduce the work of breathing. Orthopnea refers to an abnormal condition in which a person must sit or stand to breathe comfortably. Patients with chronic pulmonary disease may use a tripod position or prefer sleeping while leaning forward over a table.

The second position is *lying horizontally,* which helps patients who are hypoxemic and have acute lung disease. The distribution of pulmonary capillary blood flow is affected by gravity in different body positions. The greatest volume of pulmonary blood flow occurs in the gravity-dependent areas of the lung. Thus, the areas of the lung that are most dependent become the best ventilated and perfused.[1]

Other Interventions

Patients can alternate activity with rest periods. For example, if a patient becomes dyspneic after a bath or shower, allow a rest period before a meal or exercise. Many patients with COPD perceive they can breathe easier when there is an increase in air circulation, which they accomplish by using an electric fan. Patients' coping may be improved by encouraging them to express their feelings about their impaired gas exchange and how it has changed their lives.

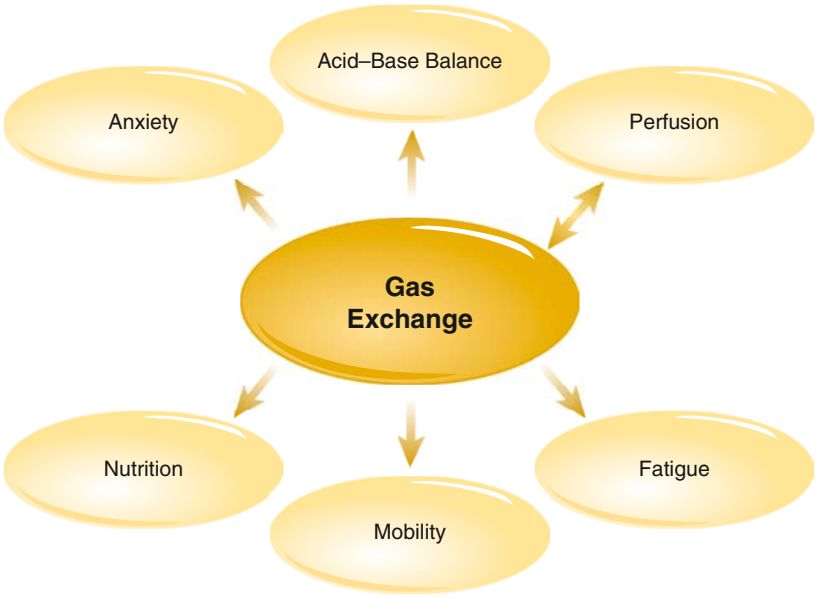

Fig. 18.4 Gas Exchange and Interrelated Concepts.

CLINICAL NURSING SKILLS FOR GAS EXCHANGE

- Assessment
- Oxygen administration
- Positioning
- Peak expiratory flow rate
- Nebulizers
- Chest physiotherapy
- Airway suctioning
- Endotracheal tube and tracheostomy care
- Chest tube
- Mechanical ventilation
- Medication administration

INTERRELATED CONCEPTS

Gas exchange is interrelated with nearly all of the health and illness concepts within this textbook because all cells in the body depend on gas exchange. Concepts that most closely interrelate with gas exchange are illustrated in Fig. 18.4.

Acid–Base Balance is affected by gas exchange in several ways. Diseases that cause the retention of carbon dioxide, such as COPD, create increased levels of carbonic acid, which causes respiratory acidosis. Conversely, when excessive carbon dioxide is exhaled such as during an anxiety attack, less carbonic acid is formed, causing a respiratory alkalosis. Hypoxia attributable to inadequate **Perfusion**, such as from a myocardial infarction, causes lactic acid formation that causes metabolic acidosis. When patients experience breathlessness, such as during an asthma attack, they may experience anxiety due to the lack of oxygen. **Anxiety** is also linked to gas exchange because individuals who are unable to get sufficient oxygen become very anxious.

Mobility may be reduced when patients with impaired gas exchange become dyspneic when walking or climbing stairs.

BOX 18.3 EXEMPLARS OF IMPAIRED GAS EXCHANGE

Impairment of Ventilation

- Acute respiratory failure
- Acute respiratory distress syndrome
- Asthma
- Atelectasis
- Chronic bronchitis
- COVID-19
- Cystic fibrosis
- Emphysema
- Influenza
- Lung cancer
- Pleural effusion
- Pneumonia
- Pneumothorax
- Respiratory syncytial virus
- Trauma and flail chest
- Tuberculosis

Impairment in Perfusion

- Aneurysm
- Heart failure
- Peripheral artery disease
- Pulmonary emboli
- Shock

Impairment in Transportation

- Aplastic anemia
- Folic acid deficiency anemia
- Hemolytic anemia
- Iron deficiency anemia
- Pernicious anemia
- Sickle cell anemia
- Thalassemia

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Fatigue is related to gas exchange in two different ways. When anemia is a cause of impaired gas exchange, fatigue may be a manifestation of the anemia. However, patients who must use accessory muscles and work hard to breathe, such as those with emphysema, exert significant energy to breathe, which contributes to fatigue.

Nutrition is a concern for patients who expend more than usual energy to breathe, such as those with emphysema or cystic fibrosis. They require high-calorie, high-protein, nutritious foods in small servings so they do not tire while eating. When dyspneic, patients focus on getting air in and are, thus, unable to eat. Patients with anemia need food high in iron to maintain or increase their hemoglobin levels.

CLINICAL EXEMPLARS

There are multiple conditions that contribute to impaired gas exchange—more than are described in this text. Box 18.3 lists common conditions associated with impaired gas exchange across the lifespan; further details about these conditions can be found in medical–surgical and pediatric nursing textbooks.

Featured Exemplars

Asthma

Asthma is a chronic disorder characterized by periods of reversible airflow obstruction. These *asthma attacks* are caused by hyperreactive airways leading to contraction of the muscles surrounding the airways and inflamed airways. Patients experience wheezing, coughing, dyspnea, and chest tightness. Factors involved in the development of asthma include genetics, inhalation of airborne allergens or pollutants, airway infections, exercise, or emotional stress. Asthma can be controlled with medications and avoidance of triggers for asthma attacks. Prevalence for adults is higher among females, people 20 to 24 years old, and multirace and American Indian or Alaska Native persons. Among children, prevalence is higher among males, children 5 to 14 years old, and multirace and Black persons.[12]

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease is characterized by chronic airflow limitation that is not fully reversible. Chronic obstructive pulmonary disease includes two obstructive airway diseases: chronic bronchitis and emphysema. *Chronic bronchitis* develops when hypersecretion of mucus obstructs the trachea and bronchi, caused by irritants such as cigarette smoke, air pollution, or respiratory infection. Symptoms are productive cough and dyspnea on exertion.[2] *Emphysema* develops when the alveolar walls are destroyed leading to permanent abnormal enlargement. The most common cause is cigarette smoking. Patients with emphysema are often underweight, with a barrel chest, and become short of breath with minimal exertion.[5] Chronic obstructive pulmonary disease is typically diagnosed in adults approximately 50 years of age after a long history of smoking. It is the third leading cause of death by disease in the United States.[13]

Lung Cancer

Lung cancer is an uncontrolled growth of anaplastic cells in the lung tissue. Common causes include cigarette smoke, pipe and cigar smoke, exposure to radon gas, and occupational and environmental exposures such as secondhand smoke, asbestos, radiation, and air pollution. Cigarette smoking is by far the most important risk factor for lung cancer. The most common initial symptom is persistent cough, but other complaints include chest pain, productive cough, dyspnea, and recurrent lung infections. Lung cancer remains the leading cause of cancer-related deaths in the United States. Incidence and mortality rates have steadily declined since 2000, attributed to reductions in smoking.[14]

Pneumonia

An inflammation of terminal bronchioles and alveoli results in pneumonia. Microorganisms are the most frequent causes. Viral pneumonia tends to produce a nonproductive cough or clear sputum, whereas bacterial pneumonia causes a productive cough of white, yellow, or green sputum. Other manifestations include fever, chills, dyspnea, fatigue, and sharp or stabbing chest pain upon inspiration.[15] Rhonchi or crackles may be heard on auscultation. Children may experience retractions and nasal flaring. Viral pneumonias occur more frequently than bacterial pneumonia in children of all ages.[3] Older adults with pneumonia may experience confusion.[15]

Coronavirus (COVID-19)

Most individuals afflicted with COVID-19, a viral infection, will experience mild to moderate effects on the respiratory system. Individuals with COVID-19 may experience a cough, fatigue, and shortness of breath or difficulty breathing, all of which can impede gas exchange.[16] Most individuals recover without specialized treatments. Those with chronic respiratory disease are vulnerable to develop serious illness potentially leading to coronavirus pneumonia and acute respiratory distress syndrome, associated with a high mortality rate.[17] Long-term effects of COVID-19 (known as Long Covid) can cause gas exchange impairment lasting for months or even years. Specifically, many of individuals with Long Covid have less exercise capacity and more radiologic abnormalities, even after their recovery from COVID-19 pneumonia.[18]

Anemia

Oxygen moves from the alveoli to the cells attached to erythrocytes. When erythrocytes are in short supply, which occurs in anemia, oxygenation is less than optimal. Anemia is caused by disorders that interfere with the formation of erythrocytes (aplastic anemia, folic acid deficiency, iron deficiency, pernicious anemia, and thalassemia), premature destruction of erythrocytes (sickle cell anemia), and loss of erythrocytes (hemolytic anemia). Despite the cause, common manifestations that occur in all anemias include weakness, fatigue, pallor, exertional dyspnea, dizziness, and lethargy.[1] Vitamin B_{12} deficiency may occur in 12% of older people because of inadequate dietary intake or malabsorption from low stomach acid.[5]

Pulmonary Emboli

A blockage of pulmonary arteries by a thrombus, fat or air embolism, or tumor tissue creates a pulmonary embolism. The embolus travels with blood flow through smaller blood vessels until it obstructs perfusion of alveoli. Manifestations are nonspecific, making diagnosis difficult. The classic triad of dyspnea,

CASE STUDY

From Stockbyte/Thinkstock.

Case Presentation

Chiyo Nakamura is an 87-year-old woman who was admitted 1 day ago to an inpatient rehabilitation hospital following an open reduction, external fixation for a hip fracture at a large medical center. Upon transfer, her condition was described as stable and her appetite and level of mobility since surgery were reported as "limited" citing ongoing postoperative pain as a barrier to ambulation.

Mrs. Nakamura's current vital signs are as follows: temperature, 99.1°F; blood pressure, 150/78 mm Hg; heart rate, 100 beats/min; and respiratory rate, 24 breaths/min and shallow. Upon auscultation, the nurse hears subtle crackles in the lower lobes of both lungs. The nurse reflects on these findings in the context of risk factors and recognizes that Mrs. Nakamura may have atelectasis as a postoperative complication.

The nurse knows Mrs. Nakamura needs to deep breathe, increase activity as tolerated, and increase fluid intake. The nurse asks her to use the incentive spirometer and notices she is moving only 800 mL of air. The nurse emphasizes the importance of using the incentive spirometer approximately 10 times every hour while awake to help get air into her lungs. Together, they agree on a goal of moving 1500 mL using the spirometer. The nurse also talks with Mrs. Nakamura about giving her pain medication to make movement more tolerable. After receiving pain medication, Mrs. Nakamura is assisted to sit on the side of the bed, then walks a few steps to a wheelchair, and then goes to a community room for breakfast. Later in the morning, Mrs. Nakamura ambulates in the hallway with assistance from a physical therapist. After ambulating, she reports feeling quite short of breath and is anxious to return to her bed.

Case Analysis Questions

1. What risk factors for impaired gas exchange does Mrs. Moore have?
2. What other interventions should be considered to promote optimal gas exchange?

chest pain, and hemoptysis occurs in approximately 20% of patients. Hypoxemia with low arterial carbon dioxide is a common finding. Most emboli arise from deep vein thromboses in the legs. *Venous thromboembolism* is the preferred terminology to describe the spectrum of pathology from deep vein thrombosis to pulmonary embolism. The highest rate of deep vein thrombosis is seen in patients with prolonged bed rest.

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CONCEPT 19

Reproduction

Nancy Jallo and Juliane Milburn

The creation of all life occurs as a result of reproduction. As a foundational concept in the biologic sciences, reproduction has been studied extensively. Two main types of reproduction described are sexual and asexual reproduction. With asexual reproduction, an organism can create genetic copies of itself. Viruses, bacteria, fungi, and some plants reproduce through such a process. Sexual reproduction is a biologic process in which a combination of genetic material from two sources is needed. Mammals, fish, reptiles, and most plants reproduce through this process. The purpose of this concept analysis is to present the concept of reproduction as it applies to humans, and in the context of nursing from the formation of reproductive cells and the creation of a pregnancy through birth.

DEFINITION

There are multiple definitions of human reproduction in the literature. However, the foundational principle of human reproduction is that it is the process by which human beings produce a new individual. Conception of a child occurs when the sperm fertilizes the egg. The sex glands, or gonads (ovaries in the female and testes in the male), produce the germ cells (oocytes and spermatozoa) that unite and grow into a new individual.

During sexual intercourse, the interaction between the male and female reproductive systems may result in fertilization of the woman's ovum by the man's sperm. Fertilization of the ovum may also be achieved outside the uterus without sexual intercourse using a process known as assisted reproductive technology (ART). This includes procedures such as in vitro fertilization and intrauterine insemination. Childbirth follows a typical gestation period of 40 weeks. For the purpose of this concept presentation, reproduction is defined as *the total process by which organisms produce offspring.* In humans, the concept is referred to as human reproduction.[1]

SCOPE

In the broadest sense, the scope of reproduction falls into one of two states—the nonpregnant state and the pregnant state (Fig. 19.1). However, substantial complexity underlies this simplistic dichotomous perspective.

Nonpregnant State

The majority of the life of a female is spent in a nonpregnant state. All individuals in a nonpregnant state represent one of two variables: (1) not pregnant by choice, or (2) not pregnant, not by choice. *Not pregnant by choice* is represented by individuals who are capable of creating a pregnancy and take specific measures to avoid a pregnancy. Pregnancy avoidance behavior is achieved through contraceptive measures or sexual abstinence. By contrast, *not pregnant, not by choice* represents individuals or couples who are unable to create a pregnancy—regardless of whether pregnancy is desired or not. Three categories representing this variable are (1) individuals who have not yet reached sexual maturity, (2) individuals who have reached sexual maturity and are infertile (including women who have reached menopause), and (3) those who have reached sexual maturity and are fertile but partnerless or lack resources to create a pregnancy by other means.

Pregnant State

The other state is pregnancy and represents individuals or couples who intentionally create a pregnancy and those experiencing an unplanned pregnancy. The pregnant state begins at conception and is sustained until birth or ends with a premature cessation of the pregnant state. Not surprisingly, the range of emotion and acceptance of a pregnancy ranges from significant joy and celebration to worry and stress (particularly if the pregnancy was unplanned or if complications arise).

Not pregnant		Pregnant	
By Choice	Not by Choice	Unplanned	Planned
• Contraceptive measures • Abstinence	• Sexual maturity not reached • Infertility • Partnerless	Conception to birth or pregnancy termination	

FIG. 19.1 Scope of Concept: Reproduction.

NORMAL PHYSIOLOGICAL PROCESS

For normal human reproduction to occur, the following complex developmental and physiologic events must occur sequentially: the formation of reproductive cells, the menstrual cycle, conception, and pregnancy. Although the majority of this discussion focuses on the female, the male role in reproduction is not to be minimized.

Formation of Reproductive Cells

A physiologic discussion of reproduction starts with the formation of reproductive cells known as germ cells. These cells carry the genetic materials needed for conception and the diverse genetic material needed to form new individuals and link the generations.[2] *Gametogenesis* is a term that refers to the formation and development of germ cells—oocytes and spermatocytes.[1] A specialized form of cell division called meiosis produces cells with a haploid number of 23 chromosomes. Two sequential meiotic cell divisions occur during gametogenesis. Homologous chromosomes pair during prophase and separate during anaphase. The first meiotic division is a reduction division in which each new cell forms a secondary oocyte or spermatocyte retaining the haploid number of chromosomes. In the second meiotic division, each chromosome divides to form two chromatids that are drawn to a different pole of the cell. The daughter cells that are produced contain a haploid number of chromosomes representative of each pair.[1] The primary spermatocyte contains one X and one Y chromosome; thus, during the first reduction division, two secondary spermatocytes are produced—one X and one Y. Therefore, spermatocytes have either X or Y chromosomes. Because the primary oocyte contains two X chromosomes, all oocytes have X chromosomes.

Oogenesis

In females, the process of egg formation (ovum) begins during fetal life and is known as oogenesis. The ovaries at birth contain all the cells that may undergo meiosis during a woman's reproductive stage of life. Only 400 to 500 ova out of 2 million oocytes will mature during a woman's reproductive years. Primary oocytes begin their first meiotic division before birth but remain suspended in prophase until puberty. At puberty, at the onset of menarche, monthly cycles begin, and usually one oocyte matures and completes the first meiotic division. The second meiotic division begins at ovulation but progresses only to metaphase when division is arrested. If the zona pellucida (inner layer) is penetrated by a sperm, the second meiotic division is completed.[1]

Spermatogenesis

In males, the formation of a germ cell to a sperm cell is known as spermatogenesis. This process begins at puberty under the influence of testosterone and continues throughout adult life. Spermatogenesis takes place in the seminiferous tubules within the testes. As sperm cells are produced, they travel through efferent tubules to the epididymis, where they mature. Once mature, sperm cells move to the ejaculatory duct through the vas deferens, where they wait until ejaculation.

Menstrual Cycle and Ovulation

The female menstrual cycle represents a physiologic preparation for conception. It is regulated by hormonal levels controlled by the hypothalamus, anterior pituitary, and ovaries and occurs in four stages that repeat every 28 days. Stage I (menstrual phase) occurs with the shedding of the endometrium (caused by decreases in estrogen and progesterone), triggering menstrual bleeding. Stage II (follicular phase) is the preovulation phase, whereby the ovary and follicle prepare for the release of an ovum through the influence of follicle-stimulating hormone and estrogen. In stage III (ovulation phase), ovulation occurs, which is the process in which the ovum is expelled from the follicle (triggered by a sharp rise in estrogen and luteinizing hormone) and is drawn into the fallopian tube. During stage IV (luteal phase), cilia in the fallopian tubes are stimulated by high estrogen levels, which propel the ovum toward the uterus. The follicle transforms into the corpus luteum during this phase and releases progesterone, which causes the uterine wall to thicken in anticipation of supporting a fertilized egg. If fertilization does not occur, the corpus luteum disintegrates and is usually reabsorbed by the woman's body.[3] With the degeneration of the corpus luteum, estrogen and progesterone decrease, thus triggering the shedding of the uterine wall and starting the next menstrual cycle.

Pregnancy

Pregnancy is considered a normal physiologic process that occurs without incident in the large majority of cases. Regardless of whether the pregnancy is planned or unplanned, it is an expected outcome among women of childbearing years who have sexual intercourse in the absence of contraceptive measures, or when contraceptive measures fail. Pregnancy begins with fertilization and, in the absence of complications, involves a 40-week gestation period (measured from the first day of the last menstrual period) and results in a live birth. The trends in pregnancy rates often vary by population subgroups and age and are influenced by factors such as changes in sexual activity and new contraceptive methods; changes in marital/cohabitation trends; social and economic context of childrearing, and public health threats.[4]

Fertilization

During sexual intercourse, as many as 500 million sperm are ejaculated through the penis and into the vagina. Because of their mobility, sperm travel through the cervix into the uterus and into the fallopian tubes in search of an ovum. However, only a small percentage will reach the ovum.[3] Fertilization of an ovum by sperm usually occurs in the lower third of the fallopian tube (Fig. 19.2) when a sperm penetrates the ovum membrane. The sperm and ovum are enclosed in a process called the cortical reaction; this prevents other sperm from entering the ovum. The ovum nucleus becomes the female pronucleus, and the second meiotic division is completed. The head of the sperm enlarges to form the male pronucleus and the tail degenerates.

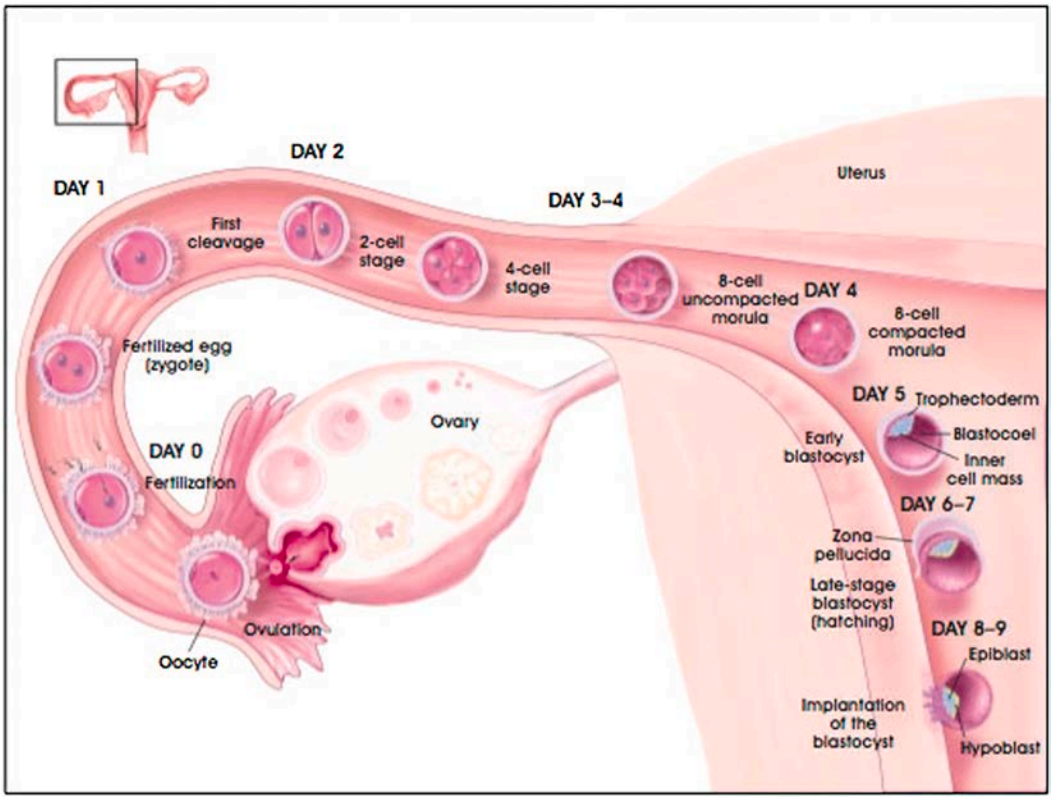

FIG. 19.2 Fertilization and Implantation. (From National Institutes of Health. [2010]. *Blastocyst implantation picture.* https://stemcells.nih.gov/info/2001report/appendixA.htm. © 2001 Terese Winslow.)

Fertilization results in a new cell called the zygote, which has two sets of chromosomes; half of the zygote genetic material is obtained from the ovum and half is obtained from the sperm.[3] A female develops through the fertilization of the ovum by an X-bearing sperm, producing an XX zygote; a male is produced through the fertilization by a Y-bearing sperm, producing an XY zygote. The zygote is the first cell of the new unique individual.[1] Within the fallopian tube, a membrane-like sac, known as the zona pellucida, forms around the zygote. Approximately 30 hours after fertilization, division of the zygote (a process known as cleavage) begins. The zygote divides and two blastomeres are produced; soon thereafter, these divide again to form four blastomeres. Rapid cellular division occurs while the blastomeres travel down the reproductive tract. Although there is an increase in the number of cells, there is no increase in mass. Approximately 3 days after fertilization, a cell mass of 12 to 16 blastomeres, known as the morula, enters the woman's uterus.[1,3]

Implantation

A cavity is formed within the morula 4 days after fertilization. It becomes a blastocyst and floats freely within the uterus for 2 days. Spaces form between the central cells of the morula and fluid passes through the zona pellucida, collecting in these spaces. The zona pellucida then lyses and degenerates. The cells then separate into an outer layer known as a trophoblast, which forms the placenta, and an inner layer known as an embryoblast, that develops to form the embryo.[1] Implantation occurs when the blastocyst embeds in the endometrium (the lining of the uterus) usually between 6 to 10 days after fertilization[1] as shown in Fig. 19.2. The blastocyst receives nourishment from the endometrial glands in the uterus, including carbohydrates, pyrimidines, purines, and amino acids, by active and passive transport. When the blastocyst is totally covered, the endometrium is called the decidua.[1]

Embryonic Period

The embryonic period is the stage of pregnancy development from day 15 through 8 weeks after fertilization. During this critical time, the development of body systems and organs occurs. This is a time when the pregnancy is most vulnerable to malformations caused by teratogens, which are substances, exposures, certain infections, and some health problems that can cause abnormal fetal development.[1] Teratogenicity is a major concern during this period because all external and internal structures are developing (Fig. 19.3). A pregnant person should avoid exposure to all potential toxins during pregnancy, especially alcohol, tobacco, radiation, and sources of infection during embryonic development. At the end of this period, the embryo has human features and is referred to as a fetus.

Fetal Period

The fetal period represents the final stage of development beginning from week 9 after fertilization until birth and is a period of significant fetal growth. Because differentiation of major organs occurs during the embryonic period, the fetus is less susceptible to congenital malformations. The process of human development presented by stages is shown in Fig. 19.3.

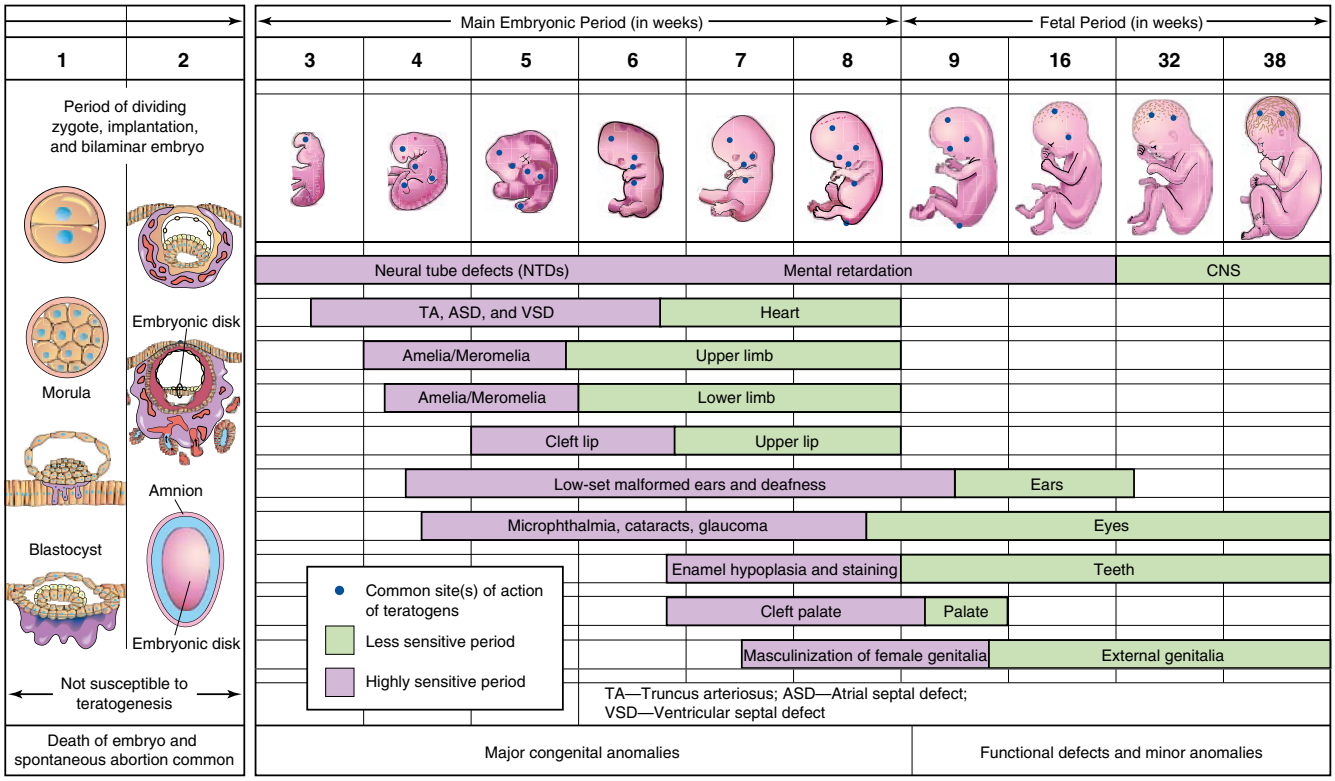

FIG. 19.3 Critical Periods in Human Development. (From Moore, K., & Persaud, T. [2008]. *Before we are born: Essentials of embryology and birth defects* [7th ed.]. Philadelphia: Saunders.)

VARIATIONS AND CONTEXT

A number of problems are associated with the concept of Reproduction. These issues encompass multiple areas to include infertility, pregnancy loss, and unintended pregnancy.

Infertility

Infertility is defined as not being able to get pregnant despite having unprotected, well-timed intercourse for at least 1 year when the woman is under age 35 and after 6 months for women 35 years and older.[3] Although difficult to calculate for a number of reasons, it is estimated that the rate of infertility among heterosexual women aged 15 to 49 in the U.S. is 19%.[5] It is important to realize infertility is not just a women's issue—both men and women can have fertility issues.[5] Patients with infertility are usually referred to a reproductive endocrinologist or obstetrician who specializes in infertility.

There are a number of conditions and factors associated with infertility. Essential to fertility is a normally developed structural reproductive tract as well as an intact and functioning hypothalamic-pituitary-gonadal axis that supports the formation of ova and sperm.[6] Both males and females may experience problems with these critical components. Female infertility may be the result developmental anomalies, primary or secondary anovulation, pituitary or hypothalamic hormone disorder, adrenal gland disorder, congenital adrenal hyperplasia, disruption of hypothalamic–pituitary–ovarian axis, amenorrhea after discontinuing oral contraceptive pills (OCPs), premature ovarian failure, and increased prolactin levels.[3,6] Uterine, tubal, and peritoneal factors affecting female fertility include developmental anomalies, reduced tubal motility, tubal inflammation, tubal adhesions, endometrial and myometrial tumors, pelvic adhesions, endometriosis, chronic cervicitis, pelvic inflammatory disease, and inadequate cervical mucus.[3,6] Other factors affecting female fertility include nutritional deficiencies (such as anemia, underweight, and obesity), thyroid dysfunction, genetic disorders, anxiety, depression, and idiopathic conditions.[3,6]

Common factors contributing to infertility in men include hormonal disorders such as low testosterone levels, hypopituitarism, and other endocrine disorders. Structural and anatomic complications affecting male fertility include testicular damage caused by mumps, undescended testes, hypospadias, varicocele, obstructive lesions of the vas deferens or epididymis, or retrograde ejaculation. Other factors affecting male fertility include sexually transmitted infections (STIs), exposure to environmental hazards (such as radiation or toxic substances), exposure of the scrotum to high temperatures, nutritional deficiencies, obesity, the presence of antisperm antibodies, substance abuse, changes in sperm motility, decrease in libido, impotence caused by substance misuse and by some medications (such as antihypertensives), and idiopathic conditions.[6] With age, male testes become smaller and softer, and sperm shape, quality, quantity, and motility decline. There is also an increased risk of genetic defects in the sperm.[1]

Pregnancy Loss

Human reproduction may be limited by spontaneous pregnancy loss, usually defined as *a pregnancy that ends due to natural causes before 20 weeks gestation*.[7] While spontaneous

abortion is the common medical term, the common lay term is miscarriage.[8] It is estimated 10% to 15% of pregnancies end with a spontaneous loss and the majority of those occurring before 12 weeks gestation.[7] There are a multitude of reproduction problems characterized by failure to maintain a pregnancy. These problems are related to risk factors and are categorized by trimester. First-trimester risks include advancing maternal age and prior early losses; uterine abnormalities; chromosomal abnormalities; experiencing infections, such as rubella or toxoplasmosis; autoimmune disorders; ectopic pregnancy; or trauma.[8] Risks of pregnancy that become evident during the second and third trimesters include fetal anomalies, maternal systemic conditions (e.g., gestational diabetes, gestational hypertension, and preeclampsia), and infections.

Unintended Pregnancy

Pregnancy is considered an expected event among persons who engage in intercourse without contraceptive measures. An unintended pregnancy occurs when contraceptive efforts fail, when consensual or nonconsensual sexual intercourse occurs without contraceptive measures, or when people lack education regarding conception and pregnancy. It is estimated nearly half of pregnancies in the United States are unintended.[9] An unintended pregnancy is any unplanned, mistimed, or unwanted pregnancy at the time of conception.[10]

- An *unplanned* pregnancy refers to a pregnancy not desired at that particular time.
- A *mistimed* pregnancy refers to when a woman wanted to become pregnant but at a later date.
- An *unwanted* pregnancy occurs when a woman does not want to become pregnant at that time or any future time.[11]

CONSEQUENCES

The consequences of reproductive problems are highly variable and can affect the woman, her partner, and the fetus. Issues with infertility, maintaining a pregnancy, and unintended pregnancy can be associated with stress, anxiety, and grief, as well as economic stressors. Such consequences can be debilitating to individuals and couples.

Complications of pregnancy can lead to several consequences as well, depending on the type of problem and the stage of pregnancy or labor at which the complications occur. Fetal consequences can range from fetal stress to long-term health problems for the infant (e.g., genetic and congenital defects) and fetal demise. Fetal distress may be caused by any number of physiologic or mechanical insults; for example, a pregnant woman involved in a motor vehicle collision may sustain abdominal trauma that could then cause fetal distress. Premature infants often have long-term physiologic consequences, including developmental and intellectual disabilities or delays, cerebral palsy, or problems with sensory integration. In cases of severe prematurity or fetal distress, fetal death may occur in the intrapartum setting.

Physiologic consequences to a mother can range from lacerations to the perineum that occur during childbirth, to postpartum hemorrhage and death.

RISK FACTORS

Despite the complexity of human reproduction, this process occurs without incident in the majority of individuals. However, as discussed previously, problems do occur, and reproduction does not always progress as expected. This section identifies common risk factors for problems associated with reproduction. Risk factors affecting successful human reproduction and fertility transcends all socioeconomic groups and is greatly affected by social determinants of health.

Populations at Risk

Populations at risk for reproductive problems can be identified within the broader context of factors influencing health such as sociodemographic factors, sexual-reproductive health knowledge, risk behaviors, health status, and access to care.[12] Recognizing these potential risks help provide appropriate assessment, care, and better understand patients.

Adolescents are likely to face a range of health and social challenges. For example, initiation of sexual activity while they lack adequate knowledge and skills for protection places adolescents at a higher risk of unwanted pregnancy and STIs including HIV/AIDS. Adolescent pregnancy concerns and complications include impaired nutrition, anemia, infections, depression, social isolation, preeclampsia, protracted labor, cephalopelvic disproportion, premature birth, and cesarean section.[3]

After age 35, women's fertility declines and the risks of spontaneous loss, chromosomal problems, and chronic problems, such as hypertension and diabetes, increases, often resulting in negative reproductive health outcomes.[13] An increasing number of women of reproductive age have chronic conditions such as hypertension, diabetes, uterine fibroids, chronic infections, obesity, polycystic ovary syndrome, heart disease which increased the risk of reproductive health morbidities and mortality.[14]

Individual Risk Factors

There are numerous individual risk factors for women and men affecting reproductive health and pregnancy outcomes. These can be categorized into biophysical, psychosocial, sociodemographic, and environmental factors. Some of the risk factors for human reproduction fit into multiple categories.

Biophysical Factors

Genetic concerns encompass altered or mutated genes, inherited disorders, chromosomal anomalies, multiple gestation, large fetal size, and ABO incompatibilities. Nutritional concerns include malnutrition, diets, young age, prepregnancy obesity, inadequate or excessive weight gain, and anemia. Medical and obstetric disorders encompass complications of past or current pregnancies, obstetric illnesses, and previous pregnancy losses.[1,15] Changes in sexual identity and expression continue to evolve in the United States and around the globe. The physical, psychological, and social factors that accompany these changes affect reproductive health promotion and care. Additional concerns with this population include but are not limited to hormonal therapy and the effects on fertility and pregnancy, cost of fertility options, social and mental health challenges, and limited research data on reproductive outcomes and safety.[16]

Psychosocial Factors

Maternal emotional well-being has been found to influence reproductive health.[1,15] Psychosocial factors include substance use, unintended pregnancy, social support systems and financial resources, age and relationship dynamics, intimate partner violence, underlying mental health conditions, and much more. A woman's readiness for motherhood, relationship with her partner and support systems, history of trauma or anxiety, and many other factors affect her adaptation to the developmental and family changes inherent in a pregnancy and birth and can have a significant effect on the physical and emotional outcomes of this process.[17]

Sociodemographic Factors

The two major areas defined by the World Health Organization (WHO) that affect health and well-being are conditions of daily life (the circumstances in which people are born, grow, live, work, and age) and inequitable distribution of resources, money, and power.[18] Sociodemographic factors with a prominent influence on reproduction include low income, inadequate prenatal care, age at both ends of the spectrum of reproductive years (younger than age 15 years and older than age 35 years), parity, marital status, geographic location (urban vs. rural), and race/ethnicity.[13] It is beyond the scope of this concept presentation to discuss every ethnic group worldwide. However, non-Hispanic black women are three to four times more likely to die of pregnancy-related causes annually compared with white women in the United States.[19] African American newborns have the highest rate of prematurity, low birth weight, and infant mortality.[20]

Environmental Factors

Environmental factors affecting reproductive health and pregnancy outcomes include industrial pollution, radiation, chemical exposure, bacterial and viral infections, drugs (over-the-counter, therapeutic, and illicit), and stress.[1,21] The most recent COVID-19 pandemic brought social determinants of health to the forefront with regard to reproductive care and outcomes for women and children. Access to health care, adequate nutrition, safe physical environments, and more were greatly affected by the pandemic and highlighted gaps in the healthcare system as well as social safety net needs for populations at risk.[22]

ASSESSMENT

The assessment of human reproduction involves history, examination, and diagnostic testing. Nurses should have a basic understanding of the elements of an assessment; they should also be able to recognize abnormal findings and understand common diagnostic tests related to normal reproduction.

History

Elements of a reproductive and sexual health history include inquiring about sexual history (including number and sex of partners), contraceptive history (including methods previously used and reasons for discontinuation), STI history, relevant surgical history (e.g., removal of polyps, fibroids, or neoplasms of the genitourinary system), alterations in pelvic support (including uterine displacement, uterine prolapse, cystocele, or rectocele), Papanicolaou test history (including normal and abnormal results), and menstrual history. Additional pertinent history includes immunization status (including but not limited to hepatitis B, rubella, and tetanus), mental health history, dietary history (including any history of deficiency or disordered eating), alcohol and caffeine intake, drug use (both prescribed and nonprescribed), and known genetic familial disorders. Positive findings that are not expected would alert the nurse that additional testing, screening, or monitoring may be needed.[15]

An obstetric history includes the number of pregnancies (**G**ravidity), the number of full-**T**erm births, the number of **P**reterm births, the number of **A**bortions (spontaneous or elective) and number of **L**iving children. The acronym GTPAL is often used to document this information. The obstetric history also includes information about each pregnancy including the course of the pregnancy, process of labor, delivery (method), health and weight of infant at birth, and postpartum course.

Subjective assessment of the pregnant woman may reveal a number of changes or discomforts in various stages of the pregnancy related to hormonal influences, vascular changes, and other physical and emotional changes related to a growing fetus. Commonly noted changes include, but are not limited to, changes to the breasts, gastrointestinal (GI) system, skin pigmentation, as well as symptoms such as increased urinary frequency and urgency, fatigue, nausea and vomiting, and acne. As pregnancy advances, common changes include shortness of breath, dependent edema in the lower extremities, Braxton Hicks contractions, and fetal movement beginning anywhere from 16 to 20 weeks.[23]

Examination Findings

When conducting a physical examination on a pregnant person, normal vital signs are expected, including normotension, afebrile state, and normal respiration and pulse. In addition, although many pregnant women experience some degree of varying discomfort during their pregnancy due to musculoskeletal changes, significant pain or discomfort is not expected. Weight gain is expected to be within normal limits depending on the patient's prepregnancy body mass index (BMI), prepregnancy nutritional status, and current pregnancy. For example, a woman who is underweight or overweight before pregnancy will have specific dietary requirements and should also be under the care of a dietician or nutritionist during the pregnancy. A woman pregnant with twins has a significantly higher daily caloric requirement than a woman carrying a single fetus.[24] Benign physical findings are expected as each body system is examined, including the cardiovascular, respiratory, GI, and lymph systems. These findings may be altered based on the woman's past medical history and current state of health.[23]

Objective data gathered on physical examination during pregnancy include changes to the reproductive system as well as the cardiovascular, respiratory, GI, urinary, musculoskeletal, neurologic, and endocrine systems. Variations in these systems are due mainly to the hormonal changes that are initiated during pregnancy, as well as a result of a growing fetus and other tissue changes. These physical alterations that occur during pregnancy serve to protect the woman's physiologic functioning while meeting the demands of the growing pregnancy to provide a nurturing environment to support the fetus.[25] Obtaining

TABLE 19.1 Routine, Screening, and Diagnostic Tests Performed in Pregnancy

First Trimester	Second Trimester	Third Trimester
• Urine or serum pregnancy test • CBC with differential • Blood type and Rh factor • Rubella titer • Hepatitis B titer • Syphilis test (RPR or VDRL) • HIV test • Urinalysis and culture • Pap test • Gonorrhea and chlamydia cultures[a] • Nuchal translucency screening at 10–12 weeks • NIPT: Noninvasive Prenatal Testing • Amniocentesis as needed • Emotional well-being	• Repeat CBC at approximately 24–26 weeks gestation • 1-h glucose tolerance test • MSAFP screen • Amniocentesis as needed • Emotional well-being	• Group B strep testing at approximately 36+ weeks of gestation • Screening and diagnostic ultrasound • Emotional well-being • Amniocentesis to determine fetal lung maturity

[a]Gonorrhea and chlamydia cultures may be repeated at any time exposure is suspected, as well as HIV testing.
CBC, Complete blood count; *MSAFP,* maternal serum α-fetoprotein; *RPR,* rapid plasma reagin; *VDRL,* venereal disease research laboratory.

adequate prenatal care and counseling is essential to assure that pregnancy changes are within the normal limits of what is expected, provide reassurance of normal variants, as well as early detection and treatment of pregnancy complications.

Objective assessment data also include visualization of the fetus by real-time ultrasound. Fetal heart activity can be noted via ultrasound by 6 to 7 weeks gestation, fetal heart tones auscultated at approximately 8 weeks by external Doppler, and palpable fetal movement felt by examiner by approximately 19 to 22 weeks. It is important to reassure women that these times are merely averages. A woman's previous pregnancy history, gestational age, and state of health may alter each of these values.[25,26]

Diagnostic Tests

Several diagnostic tests are performed during pregnancy and for reproductive health. Table 19.1 shows commonly ordered laboratory tests, screening tests, and other diagnostic studies throughout the pregnancy. Not all women need every test listed, and some may choose to defer various tests or screening procedures based on personal belief or need. For example, some women may choose not to have any diagnostic screening that would alert them to the risk of a child with Down syndrome or other trisomy. The type and frequency of testing and screening should be determined with the woman, keeping in mind her values and priorities for her health and pregnancy.[27] Also, based on various risk factors, some women may have additional screening tests done throughout the pregnancy. For example, a woman who is morbidly obese or who has a history of diabetes will require earlier glucose screening.

Various screening tests assess fetal health and development in utero. The maternal serum α-fetoprotein (MSAFP) test analyzes a sample of maternal blood and searches for abnormally high or low hormonal levels that may be indicative of trisomy 21, trisomy 18, or neural tube defects. These values are determined based on the mother's age, ethnicity, and gestational age. Because this test may be done only between 16 and 18 weeks of gestation, it is imperative to have an accurate gestational age when conducting this screening. Amniocentesis is another form of genetic analysis available to pregnant women. A sample of amniotic fluid is collected, and the fetal karyotype is analyzed, providing definitive diagnosis. It is often used as a follow-up to an abnormal screening test, such as the nuchal translucency or MSAFP. If any testing reveals abnormal findings, treatment and further monitoring may be necessary to ensure the health of the woman and her fetus.

Pregnancy Monitoring

During the first and second trimesters, the woman is usually seen once a month. The third trimester (starting at 28 weeks) begins with visits every 2 weeks. At 36 weeks, the visits are weekly until birth. The individual needs of the childbearing family are considered, and the pregnant woman may need fewer or more frequent visits depending on her health status.[27] Prenatal visits are not only important for the health and well-being of the developing child but are also important to ensure the mother's health and adjustment to the pregnancy and impending birth, as well as the health and well-being of her partner.

CORE COMPETENCIES

Reproduction

- Use information gained from a variety of sources such as family history, prenatal history, genetic factors, and physical exam findings to identify further assessments that may be needed to understand the childbearing patient's situation and provide appropriate care.
- Develop and implement a plan of care for the childbearing family that reflects an understanding of physiologic changes, pathophysiology, and pharmacologic interventions that have been prescribed, as well as modify that plan of care based on evaluation of its effectiveness in meeting the goals of the childbearing family.
- Position the patient and family as the center of the caregiving team when setting and modifying care goals for the childbearing family.
- Demonstrate cultural sensitivity and respect for diversity in family patterns while engaging in care and patient education that respect the patient's literacy level and cultural preferences in caring for the childbearing family.
- Integrate evidence-based practice based on current literature into clinical practice in healthcare settings and evaluate information obtained for relevance to planning and providing patient-centered care to the childbearing family.
- Assess the healthcare environment to determine patient safety needs of mother, newborn, and members of the childbearing family, and perform clinical procedures and medication administration adhering to quality and safety standards.

CLINICAL MANAGEMENT

The health management related to reproduction includes using interventions to prevent problems and optimize health, screening for problems, and providing collaborative interventions if problems arise. The levels of care related to the concept of human reproductive health are discussed next; prenatal care is the cornerstone to nursing care of pregnant individuals.

Primary Prevention

Primary prevention refers to health-promotion activities that further health and well-being. An example of primary prevention is teaching a group of high school students about reproductive health. Topics to discuss may include abstinence; the importance of safe sex; contraceptive options; tobacco, alcohol, and drug avoidance; avoidance of environmental toxins; folic acid supplementation; and the need for preconception counseling and prenatal care throughout pregnancy.[28]

Nurses should be instrumental in providing anticipatory guidance to women and childbearing families by providing instruction in human sexuality, reproductive knowledge, healthy lifestyle, and maternal and newborn care; offering parenting classes; and promoting healthy lifestyles through education about proper nutrition, exercise, and stress management. Education provided during teachable moments—at the right place and time—can change the course of a woman's life and positively affect her reproductive health.

The use of contraceptive agents is also primary prevention, and it is the intentional prevention of pregnancy during sexual intercourse.[29] The effectiveness of contraception varies and depends on both the method and user characteristics. Therefore, effectiveness can be measured during "perfect use," when the method is used correctly and consistently as directed, or during "typical use," when the method is used during actual use, including inconsistent and incorrect use. For example, OCPs are 99% effective in preventing pregnancy during "perfect use" compared with 91% effective during "typical use".[30] On the other hand, long-acting reversible contraception, such as intrauterine devices (IUDs), have a typical failure rate of 0.1% to 0.4%% because they are inserted into the uterus where they can remain for several years, thus reducing the risk of "typical use".[31] Other methods of contraception include abstinence, fertility awareness, coitus interruptus, spermicides, male and female condoms, diaphragms, cervical caps, vaginal sponges, vaginal contraceptive rings, transdermal patches, injectable and implantable progestins, and surgical sterilization of either the male or female.

Secondary Prevention (Screening)

Secondary prevention refers to early detection of disease and disease sequelae. An example of secondary prevention relating to reproductive health is continuing prenatal care in the second trimester of pregnancy. The purpose of prenatal care is to determine the gestational age of the fetus, identify risk for and minimize reproductive complications, define the health status of the fetus and the mother, provide education and counseling, and perform the normal screening done at prenatal clinic visits.[23] Screening includes complete blood count (CBC); blood type and Rh; rubella titer; hepatitis screening; urinalysis; urine culture; Pap smear; glucose tolerance test; and tests for gonorrhea, chlamydia, syphilis, human papilloma virus, and HIV. In addition, each visit provides a valuable opportunity to screen for the mother's emotional health and well-being (e.g., early warning signs of depression), as well as the emotional health of her partner and support people. In addition, each visit should include screening for domestic violence and abuse.

Collaborative Interventions

Collaborative interventions in this specific population include routine pregnancy care as well as management and treatment of pregnancy-related conditions or complications. Table 19.2 presents common pharmacologic agents used during pregnancy. This may include prescribing antibiotics for an STI, following up with serial ultrasounds to measure fetal growth in an infant diagnosed with a congenital condition, or referring for mental health services for issues related to maternal distress. More common examples are treatment for gestational diabetes, preeclampsia, and premature cervical dilation. Other collaborative interventions include assistive reproductive technology and abortion.

CLINICAL NURSING SKILLS FOR REPRODUCTION

- Assessment
- Education, support, and anticipatory guidance
- Fetal monitoring
- Breast-feeding education and support
- Contraception education
- Medication administration

Management of High-Risk Pregnancy

Women experiencing a high-risk pregnancy are often managed by an obstetrician/gynecologist or a perinatologist. Factors related to high-risk childbearing are categorized as biophysical, psychosocial, sociodemographic, and environmental. *Biophysical factors* include genetics, nutritional status, and obstetric-related illnesses, including gestational diabetes and preeclampsia. *Psychosocial factors* include effects of nicotine, caffeine, alcohol, and drugs on the developing fetus, and maternal psychological status. *Sociodemographic factors* include low income, lack of prenatal care, lack of access to care, pregnant adolescents or older mothers, parity, marital status, place of residence, and race/ethnicity. *Environmental factors* related to high-risk pregnancy may include infections, radiation exposure, chemical exposures such as to lead or mercury, therapeutic and/or illicit drugs, cigarette smoke, industrial pollutants, poor diet, and stress.[13]

Collaborative interventions for the management of high-risk pregnancy include ongoing assessment of maternal and fetal well-being. Maternal and fetal assessment includes review systems; focused physical exam to include vital signs, weight, fetal heart rate and rhythm, and fetal growth; and education for self-management of pregnancy discomforts, prenatal risk, and warning signs as well as anticipatory guidance as pregnancy

TABLE 19.2 Pharmacologic Agents Commonly Used in Pregnancy and the Peripartum

Pharmacologic Agents	Indications for Usage
Analgesics (e.g., acetaminophen)	Pain
Antibiotics (e.g., ampicillin, clindamycin, cefazolin, metronidazole, gentamicin, penicillin, erythromycin)	Infections
Antidepressants (e.g., sertraline, escitalopram)	Mood disorders
Antiemetics (e.g., promethazine, ondansetron)	Nausea/vomiting of pregnancy
Folic acid	Prevention of neural tube defects
Ferrous sulfate (iron)	Important for transfer of iron to fetus and to expand maternal red blood cell mass; used to treat iron deficiency
Vaccinations (e.g. Flu, Tdap, COVID-19)	Infection prevention
Laxative/stool softeners (e.g., docusate)	Constipation
Magnesium sulfate	Prevention of seizures in preeclamptic patients and fetal neurologic protection in women experiencing preterm labor
Prenatal vitamins	Support maternal nutrition and optimal fetal growth
Progesterone	Support early intrauterine pregnancy; promote uterine relaxation in those at risk for preterm labor
Rho(D) Immune Globulin (e.g., RhoGAM)	Used to prevent hemolytic disease of newborn
Tocolytics (e.g., nifedipine, terbutaline)	Suppress uterine contractions in those with preterm labor
Uterotonics: oxytocin, misoprostol, methylergonovine maleate, carboprost tromethamine	Labor induction, postpartum bleeding, and postpartum hemorrhage

advances. Ongoing fetal surveillance may include ultrasound to assess fetal growth and well-being.

Assisted Reproductive Technologies

Couples who are unable to conceive naturally may consult specialists and seek ART. ART includes all fertility treatments in which either eggs or embryos are handled.[32] These technologies involve removing eggs from a woman's ovaries, fertilizing them with sperm in the laboratory, and returning the embryo or embryos in the woman's body or donating them to another woman.[6,32] ART procedures include in vitro fertilization, embryo transfer, gamete intrafallopian transfer, zygote intrafallopian transfer, therapeutic donor insemination, or intracytoplasmic sperm injection. See other resources for discussion of these procedures.

While ART may alleviate the burden of infertility on individuals and families, it can present challenges to women's health and society. It may result in multiple births and/or preterm delivery; access to care may be difficult due to distance to treatment centers, high cost, drug treatment challenges, and anxiety about pregnancy outcome.[32]

Induced Abortion

Abortion is the purposeful termination of pregnancy. Indications may include (1) a woman's request, (2) genetic disorders of a fetus, (3) incest or rape, and (4) preserving the health of a woman.[29] The most common procedure during the first trimester is aspiration; other medical methods, including taking a combination of medications, are an option for most women at 70 days of gestation or less.[33] Other types of abortion procedures include *dilation and curettage,* in which the cervix is dilated and the products of conception are removed from the uterus, and *dilation and extraction,* which is typically used in later-aged gestations. This is usually performed during the second trimester.[29] The nurse needs to be familiar with state-specific laws regarding abortion for the state(s) in which he or she practices.

INTERRELATED CONCEPTS

Fig. 19.4 shows the interrelationships of major concepts that influence or are influenced by the process of human reproduction. **Sexuality** is closely related to reproduction. The lesbian, gay, bisexual, transgender, and queer or questioning (LGBTQ) population have unique reproductive healthcare needs and may face challenges and barriers related to their reproductive health, putting them at risk for poor health outcomes.[16]

Hormonal Regulation is closely linked to reproduction because the entire reproductive cycle is influenced by hormones, as noted previously. Hormonal imbalance is often an underlying factor in reproductive problems. The discussion of the effects of proper **Nutrition** on human reproduction and pregnancy outcomes is prevalent in the literature. For example, in the 1950s, researchers concluded that prenatal folic acid supplementation prevented pregnancy-induced megaloblastic anemia. In the 1990s, further research studies confirmed that periconceptual folic acid supplementation (600 mcg/day) and folic acid food fortification decreased the incidence of neural tube defects.[24]

Adequate **Perfusion** of maternal blood to the growing fetus is absolutely essential, as is adequate **Gas Exchange**. Placental perfusion is dependent on maternal blood volume, adequate blood flow to the uterus, as well as a functioning utero-placental exchange. There are numerous factors that can affect this blood flow and exchange system during pregnancy, such as hypertension, diabetes, multiple gestation, and more.[25] **Stress and Coping** is a concept that plays a role in the reproductive process as well, from the development of one's sexuality to the complexities of family relationship changes. In addition, the physical and emotional stressors encountered during the pregnancy and delivery process can often challenge one's coping mechanisms.

Understanding the interrelationships of these major concepts helps nurses recognize risk factors and their potential effect on the human reproductive process and pregnancy outcomes.

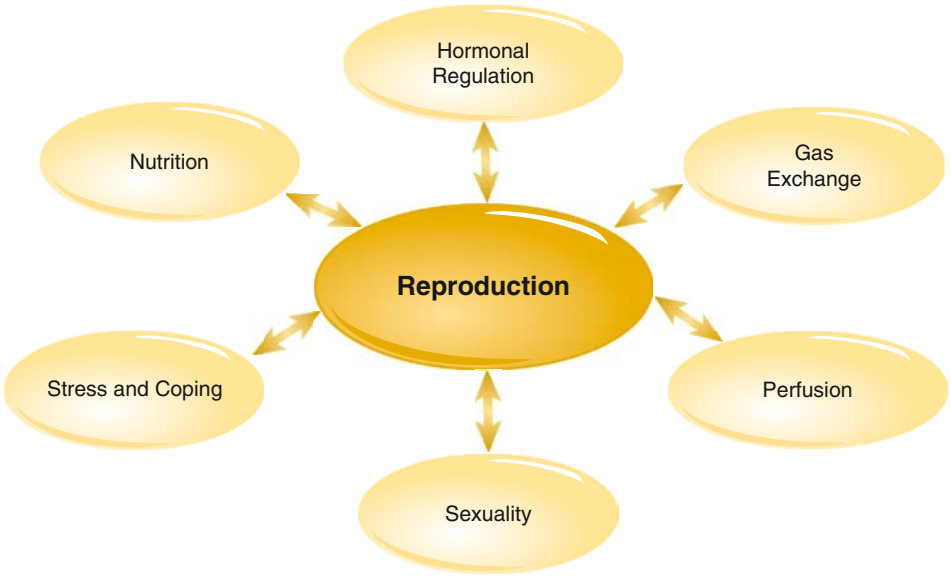

FIG. 19.4 Reproduction and Interrelated Concepts.

These are important steps in providing anticipatory guidance, clinical judgment, and screening when planning for reproductive health needs of adolescents and childbearing families.

CLINICAL EXEMPLARS

The concept of Reproduction represents many clinical situations, from pregnancy prevention to conception and pregnancy. A comprehensive discussion related to all these factors is beyond the scope of this concept, and it is best left to other textbooks devoted to sexual and reproductive health. Box 19.1 presents common exemplars related to reproductive conditions seen in clinical practice.

Featured Exemplars

Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is defined as *carbohydrate intolerance of variable severity with onset or first recognition during pregnancy that is often a consequence of the altered maternal metabolism due to changing maternal hormonal levels.*[36] Because GDM complicates approximately 7% of all pregnancies, every pregnant woman should be assessed for risk of GDM at the first prenatal visit.[36] Risk factors for GDM include BMI greater than 25, race/ethnicity (Hispanic, black, Asian, Native American), history of cardiovascular disease, prior history of GDM, and over age 40. Women at high risk should be screened for GDM as soon as possible, whereas those of average risk are often tested at the end of the second trimester, typically 24 to 28 weeks.[36]

Preeclampsia

Preeclampsia is a syndrome characterized by an increase in blood pressure after 20 weeks of gestation, accompanied by renal changes such as proteinuria in a previously normotensive woman, possibly due to alterations in vascular remodeling, endothelial dysfunction, an immune response to paternal antigens, and/or an exaggerated systemic inflammatory response.[37] In the United States, preeclampsia complicates approximately 2% to 7% of all pregnancies and can lead to numerous maternal and fetal morbidities, as well as death. Risk factors include nulliparity, age (under the age of 18, or over age 40), African American women, obesity, and pregestational diabetes.[38]

Postpartum Hemorrhage

A postpartum hemorrhage occurs when a mother loses a significant amount of blood after the delivery of the fetus. Postpartum hemorrhage is a life-threatening event and a leading cause of maternal morbidity and mortality. Postpartum hemorrhage is defined by the American College of Obstetricians and Gynecologists as cumulative blood loss greater than or equal to 1000 mL or bleeding with signs/symptoms of hypovolemia within 24 hours of birth and a blood loss of 500 mL or more after a vaginal birth, or 1000 mL or more after a cesarean section delivery. The most frequent cause of postpartum hemorrhage is uterine atony and is associated with factors such as overdistention of the uterus, anesthesia, high parity, prolonged labor, and chorioamnionitis.[39] Hemorrhage may be managed with a variety of uterotonic drugs as well as fundal massage.

Shoulder Dystocia

A shoulder dystocia complicates 0.2% to 3% of vaginal births and occurs when the fetus's anterior shoulder becomes stuck under the maternal pubic bone preventing vaginal birth. This is most commonly seen in larger infants (e.g., those born to mothers with diabetes). Consequences of prolonged or unresolved shoulder dystocia include increased risk of perineal trauma to the mother, and hypoxia and acidosis in the newborn. Risk factors include macrosomia, diabetes mellitus, and obesity.[40] Dystocia may be managed with a variety of maternal and fetal maneuvers.

BOX 19.1 EXEMPLARS OF REPRODUCTION

Normal Reproductive Health

Contraception

- Intrauterine device
- Hormonal contraception (implant, injectable, pill, patch, ring)
- Natural family planning
- Cervical cap
- Contraceptive sponge
- Condoms and spermicides
- Sterilization

Pregnancy

- Planned, uncomplicated pregnancies
- Unplanned, uncomplicated pregnancies

Problems Associated With Reproduction

Conception

- Infertility

Gestational Conditions

- Gestational diabetes
- Gestational hypertension
- Iron deficiency anemia
- Preeclampsia
- Eclampsia
- HELLP syndrome
- Hyperemesis gravidarum
- Spontaneous abortion or "miscarriage"
- Premature dilation of the cervix
- Ectopic pregnancy
- Abruptio placentae
- DIC
- Sexually transmitted infections
- Preterm labor
- Dystocia
- Prolapsed umbilical cord
- Uterine rupture
- Postpartum hemorrhage

Fetal Complications/Genetic Congenital Defects

- Neural tube defects (spina bifida)
- Other genetic anomalies
- Intrauterine growth restriction
- Impaired fetal brain development/anencephaly
- Fetal alcohol syndrome
- Premature delivery

DIC, Disseminated intravascular coagulation; *HELLP syndrome,* syndrome of hemolysis, elevated liver enzymes, and low platelet count.

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

CASE STUDY

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Case Presentation

Katherine Cordova, a 25-year-old female, gravida 4, para 2, with a history of one spontaneous abortion at 8 weeks, presents with her male partner to the community women's clinic for her first prenatal appointment. Last week she took a urine pregnancy test at home, and it was positive. The nurse at the clinic estimates her current gestational age based on Katherine's last menstrual period at approximately 10 weeks and 2 days.

The couple has been together for 4 years; her partner is the father of her other children. Both Katherine and her partner are social drinkers, but they do not smoke cigarettes. They are weight-appropriate for height, although Katherine does not engage in regular cardiovascular exercise. She estimates that she exercises perhaps twice a week for approximately 20 minutes each time. Both she and her partner work outside the home full time; she is a teacher's aide in a second-grade elementary school class, and her partner works as a police officer. They both have health insurance, and Katherine denies financial concerns at this time. In addition, Katherine denies domestic violence, and she states that they have support of their extended family and friends. This is a planned pregnancy about which she and her partner are excited.

At this time, she reports slight nausea and vomiting in the mornings, but otherwise she is having no other symptoms of pregnancy. Her medical history is grossly noncontributory, although she has a history of genital herpes simplex virus (HSV), diagnosed at the age of 20 years. She denies recent or current outbreaks, and she is not experiencing prodromal symptoms.

Katherine is prescribed prenatal vitamins that include folic acid 400 mcg daily. She is also educated on proper diet for pregnancy, which includes a diet high in grains and fiber, as well as fruits and vegetables and lean proteins. Katherine is given anticipatory guidance by the nurse practitioner in the clinic that at 36 weeks of gestation, she will need to begin suppressive therapy to help prevent HSV outbreaks during the last 4 or 5 weeks of pregnancy.

Case Analysis Questions

1. Review Fig. 19.1. Where does Katherine fall in the scope of reproduction?
2. Consider the history and clinical findings from the first prenatal visit. Are the findings typical? Is there anything that is abnormal or concerning?
3. Since this is her fourth pregnancy, what differences (if any) occur in screening practices compared with women who are experiencing their first pregnancy?

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CONCEPT 20

Sexuality

Sue K. Goebel

In general, human sexuality is how people experience and express themselves as sexual beings. It also includes our body parts and sex. It is that sense of being a "woman" or feminine and a "man" or masculine, regardless of the "parts." It includes how we express that sense of gender, whom we are attracted to, and who is attracted to us. It is the nature of relationships with ourselves and others. Sexuality is unique to the individual, is core to who we are, and is dynamic throughout a lifetime. Learning about human sexuality and the sexual well-being of patients is an important part of providing holistic patient-centered nursing care.

DEFINITION

For the purpose of this concept presentation, the World Health Organization (WHO) provides a holistic working definition of sexuality as follows:

> *A central aspect of being human throughout life encompasses sex, gender identities and roles, sexual orientation, eroticism, pleasure, intimacy and reproduction. Sexuality is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behaviors, practices, roles and relationships. While sexuality can include all of these dimensions, not all of them are always experienced or expressed. Sexuality is influenced by the interaction of biological, psychological, social, economic, political, cultural, legal, historical, religious and spiritual factors.*[1]

The word "sexuality" has its roots in the Latin word "sex," first recorded in the 1520s and used to describe "a state of being, either male or female, gender." The word *sexuality,* meaning the action or fact of being sexual, was recorded as early as 1789. Sexuality was further defined to include being capable of sexual feelings in 1879, and by the 1980s, the definition included the ideas of sexual identity and sexual orientation.[2] In 2001, the Surgeon General of the United States issued a "Call to Action" to promote sexual health and responsible sexual behavior;[3] sexual health is a function of sexuality and, thus, needs to be defined. The Centers for Disease Control and Prevention (CDC) offers the following encompassing definition of sexual health based on that of the WHO:

> *A state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence.*[4]

Other related terms are defined in Table 20.1.

SCOPE

The scope of sexuality as a concept ranges from sexual well-being to sexual ill-being; these can be a measure of sexual function and dysfunction (Fig. 20.1). Well-being is defined as *the state of being happy, healthy, or successful (function),*[5] and ill-being is defined as *a condition of being deficient in health, happiness, or prosperity (dysfunction).*[6] Although it is a simplistic definition, sexual well-being can be evidenced by the presence of positive attitudes, the absence of negative emotions, and an "overall satisfaction with life, fulfillment, and positive functioning."[4]

NORMAL PHYSIOLOGICAL PROCESS

Sexuality is more complex than one might initially imagine. To fully understand the physiologic process of sexuality, three perspectives are presented: sexual response, age-related considerations, and sexual attitudes and behaviors.

Sexual Response

First described in 1966 and based on their landmark research relying on physiologic data (i.e. heartrate, blood pressure, genital lubrication), Masters and Johnson described the human sexual response cycle to be a four-phase linear model of sexual response: excitement, plateau, orgasm, and resolution.[7] In 1979, noting this model did not address sexual desire and libido, the precursors to arousal, Kaplan proposed a three-phase linear

TABLE 20.1 Definitions Related to the Concept of Sexuality

Bisexual	A person who is attracted to two sexes or two genders but not necessarily simultaneously or equally
Gay	Men attracted to men; colloquially used as an umbrella term to include all LGBTQ people
Gender identity	The gender that a person sees oneself as
Heterosexuality	Sexual, emotional, and/or romantic attraction to a sex other than your own; commonly thought of as attraction to the opposite sex
Homosexuality	Sexual, emotional, and/or romantic attraction to the same sex
Intersex	Clinical term that describes the biologic state of having discordance in sexual organs (e.g., having both a penis and ovaries); previously referred to *hermaphrodite*
Lesbian	A woman who is attracted to women
LGBTQ	Lesbian, gay, bisexual, transgender, queer
Nonbinary	A person who does not identify as exclusively female or male
Pansexual	A person who is fluid in sexual orientation and/or gender identity
Queer	A term to refer to the entire LGBT community
Sex	A biologic term that refers to a person based on their anatomy (genitalia, chromosomes, internal reproductive organs); terms include male, female, transsexual, intersex
Sexual orientation	The deep-seated direction of one's sexual (erotic) attraction; it is on a continuum and not a set of absolute categories, sometimes referred to as *affection orientation* or *sexuality*
Trans female/woman	A male-to-female transition (MTF)
Transgender	An adjective that applies to people who feel that their assigned sex (biologic sex) does not match their true gender identity
Trans male/man	A female-to-male transition (FTM)
Transsexual	A clinical term that has historically been used to describe those transgender people who sought medical intervention for gender affirmation

LGBTQ, Lesbian, gay, bisexual, transgender, and queer.
Data from Deutsch, M. B. (Ed.), (2016). *Guidelines for the Primary and Gender Affirming Care of Transgender and Gender Nonbinary People*. Retrieved from: http://transhealth.ucsf.edu/protocols; Walker, K., Arbour, M., & Waryold, J. (2016). Education Strategies to Help Students Provide Respectful Sexual and Reproductive Health Care for Lesbian, Gay, Bisexual and Transgender Persons. *Journal of Midwifery and Women's Health, 61*(6), 737–743; Yingling, C. T., Cotler, K., & Hughes, T. L. (2016). Building nurse's capacity to address health inequities: Incorporating lesbian, gay, bisexual and transgender health content in a family nurse practitioner programme. *Journal of Clinical Nursing, 26*(17–18), 2807–2817.

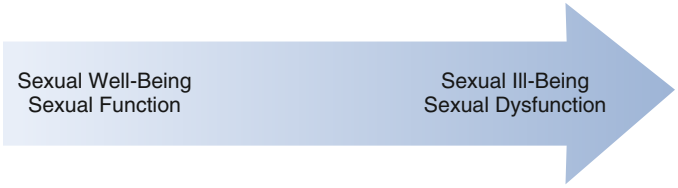

FIG. 20.1 Scope of Concept: Sexuality.

model composed of desire, arousal, and orgasm; a result of combining excitement and plateau phases, while discarding resolution altogether.[8] Basson, in 1999, introduced an intimacy-based model, conceptualizing female sexual response to be different from that of males, suggesting a circular model and postulating that arousal and desire are interchangeable; for many women, it is the desire to be intimate instead of a desire for sexual release that is the impetus for engaging in sexual activity.[9] The original works of these researchers continue to inform present-day models of sexual response and its study. Although aspects of each model may vary slightly, the general phases are the same: desire, arousal, and orgasm.

Desire

The desire to engage in sexual activity is also known as libido or sex drive. Libido is biologic, psychological, sociologic, and spiritual in nature. It can be affected by medical conditions, medications, personality, temperament, personality, lifestyle, relationships, and environmental stressors.

Arousal

Sexual arousal is the physiologic response to the release of neurotransmitters that stimulate specific areas of the brain involved in cognition, emotion, motivation, and organization of genital congestion. An awareness of being sexually aroused is described as sexual excitement. Human sexuality is a sensual matter; consider the notion that someone can be "turned on" or "turned off" sexually by varying stimuli of sight, smell, sound, taste, and touch. The stimulus–response can be excitatory or inhibitory in action; dopamine, norepinephrine, and melanocortins are excitatory neurotransmitters, whereas serotonin, prolactin, and GABA are inhibitory neurotransmitters.[7–9]

Orgasm

Generally a pleasurable sensation, orgasm produces rapid contractions of the muscles in the genital and anal area and, for some humans, throughout the body; it is the mechanism by which pelvic congestion is relieved slowly. The physical process of orgasm is similar for both sexes. In females, contractions occur in the lower part of the vagina, in the uterus, anus, and pelvic floor. Approximately 10% of women also ejaculate a clear fluid from the urethra at orgasm; the fluid originates from the Skene glands in the wall of the urethra and is much like the prostate fluid found in male ejaculate. In males, the pelvic floor muscle contractions result in a pulsatile ejaculation of seminal fluid. Ejaculation with orgasm is much more common in men than in women. Most of the time, a man will have an orgasm at the

same time he ejaculates, but occasionally men have an orgasm without ejaculating or ejaculate without having an orgasm.[7–9]

Age-Related Differences

Human sexuality can be described as a developmental process, beginning at conception and ending at death. Our early awareness of sexual self as an aspect of self-identity begins in infancy and is influenced by the dynamic combination of *biologic, societal, cultural,* and *familial* factors (Fig. 20.2). The development of human sexuality can be observed through the socially defined stages of childhood, preadolescence, adolescence, and adulthood. Three common attributes of sexual development—gender identity, sexual response, and the capacity for meaningful, intimate relationships—are essential as we move from infancy through adulthood.[10]

Childhood (Birth to 7 Years)

The physiologic capacity for sexual response is first observed in infancy: Baby boys get erections, and baby girls exhibit increased vaginal lubrication, a result of genital congestion. Infants of both sexes have been observed fondling their own genitals, a natural form of sexual expression and arousal. Attitudes and behaviors conveyed by a child's family during childhood are key in shaping sexuality as each child begins to form a gender identity—the sense of masculinity and femininity. Sexual interest and activity are observed as young children begin to model adult behaviors while they "play house" or "play doctor" as part of their natural curiosity. Facilitated by positive physical contact, the quality of relationships during early childhood is instrumental in shaping sexual and emotional relationships later in life.[10]

Preadolescence (8 to 12 Years)

During this stage, there is often a general social division of boys and girls into separate groups, and thus sexual curiosity and learning occurs between children of the same sex. Research indicates that many children engage in masturbation during this stage, with as many as 40% of females and 38% of males in a sample of college students reporting this activity prior to starting puberty.[10]

Adolescence (13 to 19 Years)

During adolescence, the physical changes associated with puberty become evident. Although these physical changes associated with sexual maturation signal the possibility of adult-like sexual activity, psychosocial factors can facilitate or inhibit such sexual expression. During adolescence, two developmental tasks present: learning to manage physical and emotional aspects of sexuality to form intimate relations and resolving the conflict between identity and role confusion.[11] Further development of gender identity, just as sexual identity, emerges as well. Sexual identity, a sense of being attractive and being attracted to others, is described in terms of being heterosexual, lesbian, gay, bisexual, transgender, and queer (LGBTQ). Over the past decade, as a result of increasing visibility and acceptance of those who identify as other than heterosexual, we speak now of sexual fluidity; it is the idea that an individual's sexual orientation and/or gender identification changes over time.[11]

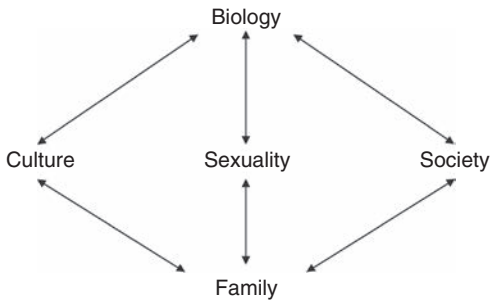

FIG. 20.2 Factors Influencing the Development of Sexuality. (From Brown, R. T., & Brown, J. D. [2006]. Adolescent sexuality. *Primary Care, 33*, 373–390.)

Adulthood (20 Years and Older)

The process of sexual maturation continues throughout a lifetime. Two major developmental tasks for adults are learning to effectively communicate in intimate relationships and making informed decisions about sexual health, such as issues of family planning and prevention of sexually transmitted infections (STIs). Attitudes and behaviors related to sexuality are further defined as *adults experience varying lifestyles and social influences*. Sexual lifestyle options include celibacy, long-term monogamy, serial monogamy, and polyamory. Although many factors contribute to changes in sexual function, sexual interest and desire may continue well into late adulthood.[11] While there is a prevailing misconception that with increasing age, sexual desire diminishes, the literature reflects otherwise; sexuality is an ongoing phenomenon throughout the life cycle.[12]

Positive Sexual Attitudes and Behaviors

Practitioners often equate positive sexual functioning with Masters and Johnson's sexual response cycle rather than considering the psychological and emotional components of what truly makes an optimal sexual encounter.[13] Recent research has identified six components of optimal sexuality.

The most predominant component is that of *being present*—in the moment and fully attentive, described as "utter immersion and intensely focused attention" in which they are fully embodied in the experience and able to allow thinking to stop and arousal to take over.[13] Being present is inextricably linked with a second component of *authenticity,* described as "feeling free to be themselves with their partner."[13] A third theme is *intense emotional connection,* described as heightened intimacy during the sexual encounter. Many couples felt that intimacy needed to be present both inside and outside of the bedroom, whereas others noted that "great sex" also occurred in new relationships, with friends or "play partners." Another component of optimal sexuality is *sexual and erotic intimacy,* described as a deep sense of caring for one another regardless of the length of the relationship.[13] Excellent *communication* is also crucial to the success of any sexual encounter, which includes not only verbal communication but also empathy and making one's needs known through touch. The sixth component is *transcendence,* a combination of heightened mental, emotional, physical, relational, and spiritual states of mind.[13] This picture

of "great sex" that is painted by these six attributes is certainly different from that touted by mass media. These findings illustrate that optimal sexuality is not necessarily about technique or skill but rather about attitude, positive behaviors, and healthy relationships.[13,14]

VARIATIONS AND CONTEXT

Many individuals experience sexual problems, but it is also important to acknowledge the wide variation based on individual perceptions and expectations. For example, one individual's desire to have sex daily and another's to have sex every few months does not delineate function versus dysfunction; the difference is not a dysfunction unless it results in a self-identified source of personal or relational distress.[15,16] As noted by Herdman, "The perception of the patient is a critical factor in determining whether the diagnosis is within the domain of nursing and amenable to nursing intervention in the form of teaching and counseling."[15] Recall that the word "normal" in scientific context generally means "average," and there is limited ability to define average when it comes to human sexuality.

Etiology of Sexual Disorders

A number of underlying situations can lead to sexual disorders or sexual dysfunction (SD), including physiologic, psychological, maturational, and environmental factors, or some combination thereof. Specifically, categories include sexually transmitted infections, SD, and intimate partner violence. Alterations in sexuality and sexual function can be further categorized as lifelong versus acquired, situational versus generalized, and organic versus psychogenic. These are not necessarily discrete categories; instead, SD is often multifactorial with an overlap between categories.[8,17]

Physiologic Factors

An alteration in physiologic function of a body system(s) (i.e., cardiovascular, respiratory, musculoskeletal, neurologic, and endocrine) can result in SD. An acute illness, infection, surgery, trauma, medications, loss of mobility, decreased activity tolerance, hormonal changes, and alcohol or substance abuse are physiologic conditions that can contribute to alterations in sexual function.[8] Pregnancy and the process of aging, although not pathologic conditions, can also result in SD.[17]

Psychological Factors

Any stressor that affects the human psyche has the potential to result in SD. Psychological and emotional factors such as fear, anxiety, fatigue, reproductive health concerns, and adverse childhood events can result in SD. Alterations in body image and self-image, role confusion, and personal conflicts (religion, culture, and values) can also contribute to SD. Furthermore, mental health conditions, such as psychosis, or alterations in cognition related to dementia will affect sexuality.[18]

Maturational

For some, SD can be a result of a knowledge deficit with regard to sexuality, birth control, safer sex practices, and changes associated with aging. Lack of general social skills can interfere with establishing intimate and social relationships necessary in the growth and development of one's own sexuality.[12,19]

Environmental

There is increasing evidence that environmental pollutants and chemicals can depress sexual function. Situational factors that influence the patient's environment include social isolation and the absence or lack of a partner, disallowing persons to experience the wholeness of their sexuality. Lack of privacy or an appropriate environment in which to be sexual can contribute to SD.[18,19]

Sexually Transmitted Infections

Among the most common sexuality problems are sexually transmitted infections. These are infections transmitted through sexual contact and can include protozoa, parasites, and viral and bacterial infections. Some STIs are associated with symptoms that cause an individual to seek medical attention, and other STIs can be asymptomatic but lead to longer-term problems, such as complications with pregnancies and increased cancer risk. Some STIs (e.g., chlamydia) are curable with treatment, and others (e.g., genital herpes) are chronic.

Female Sexual Disorders

According to the findings of population-based surveys, as many as 43% of females report sexual problems, described as a difficulty or abnormality related to sexual function. To establish a diagnosis of SD, the problem should be frequent, persistent, or at least episodic over time, and be associated with clinically significant distress.[20] Although SD may involve many physiologic factors (diabetes, neuropathy, paralysis, and hormones), the majority of research and clinical trials on SD in women have focused on psychological causes (stress, anxiety, depression, and anger). In keeping with the stages of the human sexual response cycle of desire, arousal, and orgasm, various SDs have been described. The condition of SD includes the medical diagnoses of hyposexual activity disorder, sexual aversion disorder, sexual arousal disorder, orgasmic disorder, sexual pain disorder, and persistent genital arousal disorder; the general nature of the SD can be presumed simply by its name.[17-18,20]

Male Sexual Disorders

Although men can experience SD related to sexual desire (libido), arousal, and orgasm, the two widely recognized conditions specific to men are erectile dysfunction (ED) and ejaculatory disorders. ED is an inability to develop or maintain an erection of the penis during sexual activity. Ejaculatory dysfunction is characterized by reduced or absent semen volume, which may be the result of a psychological condition, a medical condition, medication, or surgery. Stress, vascular disease, diabetes, antidepressants, antihypertensive medications, alcohol, illicit drugs, and prostate surgery can affect erectile and ejaculatory function. Four categories of ejaculatory disorders are premature ejaculation, delayed ejaculation, retrograde ejaculation, and anejaculation/anorgasmia (no ejaculation/no orgasm).[19,21]

CONSEQUENCES

A number of consequences can occur as a result of sexual disorders and are based on physiologic and psychological concerns. Physiologic consequences can include, but are not limited to, unfulfilled sexual desire, unsatisfactory sexual responses, pain, STI infection as a result of a sexual encounter, inability to create a pregnancy, and complications with pregnancies. Psychosocial consequences include problems with relationships (particularly if sexual responses between a couple have changed), low self-esteem, anxiety, and depression. The significance of the consequences is also dependent on the patient's age, interest in sex, and whether the underlying sexual disorder is a temporary or chronic condition. Psychosocial consequences and discrimination can also result when one's gender identity is questioned or not accepted.

RISK FACTORS

It is important for nurses to be aware that some groups of patients will be more vulnerable to and at increased risk for alterations in sexual well-being.

Populations at Risk

Adolescents

Addressing adolescent sexuality includes considering critical factors that may influence their behavior: socioeconomic status, family structure, future perspectives for education, and lived experiences. According to the 2019 U.S. Youth Risk Behavior Surveillance,[22] many adolescents are at risk for HIV, STIs, unintended pregnancy, and sexual violence. Furthermore, among demographic subgroups of adolescents defined by sex, race/ethnicity, and grade in school, several significant health disparities exist; this is especially so for those of who self-identify as LGBTQ. These adolescents report higher incidences of bullying, dating and sexual violence, and more suicide attempts than their heterosexual peers. Among youth 15 to 19 years old, U.S. birth rates have plunged to record lows, though they are still relatively high compared with other industrialized nations. The evidence suggests the availability and use of long-acting reversible contraceptives (e.g., IUD, implants, injections) is a contributing factor to this positive trend. There is one caveat: the use of condoms appears to have declined, and it is suggested this may be in part because of improved contraceptive options. Thus the risk for an STI may be increased, leading to acute and chronic disease and affecting sexual health and well-being.[22]

Individuals With Disabilities (Cognitive, Developmental, and Physical)

Sexuality and its expression have long been overlooked as an essential aspect and an inherent right of people with disabilities; there exists an underlying assumption that these individuals are asexual and have no need of sexual fulfillment. All people, including those with disabilities, are entitled to move toward both sexual and social maturity in the same manner.[4,23] For some with disabilities, ignorance will place them at further risk because sexual behavior is a result of poor decision-making, loneliness, manipulation, or even force instead of being a healthy expression of their sexuality. Special consideration for the geriatric population includes chronic illness (CVD, COPD, cancer), cognitive decline, LGBTQ issues previously not acknowledged, and STIs.[20]

Newly Unpartnered

A unique population at increased risk for negative sequelae are those adults who have recently separated—unpartnered—from their long-term partners because of death or divorce and are now exposed to an entirely new sexual paradigm. These adults may begin dating and suddenly have several new and unknown sexual partners.[24] Depending on their age, HIV, AIDS, and other STIs may not have been of concern when these adults were initially partnered. Although HIV/AIDS infections in the United States are now considered to be chronic conditions, all parties who have intercourse must be cognizant of their risk for exposure to these and other diseases and receive appropriate health education.[25]

Lesbian, Gay, Bisexual, Transgender, Queer

In comparison to their heterosexual counterparts, LGBTQ gay, lesbian, and bisexual youths have been found to engage in more high-risk sexual practices.[22] Young women who primarily have sex with women also report that they are likely to engage in sexual activity with men who are homosexual, bisexual, or injection drug users.[25]Adolescent boys who participate in sexual activity with bisexual men are at significantly increased risk for possible transmission of HIV and AIDS.[25] New cases of HIV diagnosis are increasing among men who have sex with men (particularly those of racial minorities) perhaps because of the misperceptions that partners are at low risk, and the belief that medical advances in the treatment of AIDS have eliminated the need for appropriate protection during sexual activity.[22,25]

Individual Risk Factors

High-Risk Behaviors

Although sexual activity is considered a normative process, some individuals inadvertently place themselves at increased risk for sexual health problems—primarily those who engage in sexual activity with multiple and casual partners and/or refrain from "safe sex" practices.[25] According to the most recent surveys, these individuals are composed of young people (particularly lesbian, gay, bisexual, and transgender youth) and men who have sex with men regardless of race.[25,26]

Of secondary importance is the influence of nonsexual high-risk behavior, such as the use of alcohol, marijuana, or other illicit substances. Prior research has shown that when these substances are ingested close to the time of sexual activity, the rate of sexual risk-taking increases. The abuse of alcohol or drugs most often results in impaired judgment and consequently less thoughtfulness related to sexual activity, safety, and protection.[26]

Underlying Medical Conditions and Medications

A number of underlying medical conditions, particularly chronic health conditions, and/or medications used to treat underlying conditions can place an individual at risk for sexual disorders. Some of the most common conditions that increase

risk include acute or chronic pain, chronic fatigue, anxiety, depression, cardiovascular disease, diabetes, and chronic respiratory conditions. Likewise, many medications can affect sexual health. Common medications that can affect sexual function are presented in Box 20.1.

ASSESSMENT

A majority of nurses believe that sexual assessment is part of their professional responsibility in providing nursing care. In practice, however, most nurses rarely or never address sexuality as a health issue, even though patients have identified it as an expected and appropriate behavior in the nurse–patient relationship.[16,27] Application of the nursing process in identifying and addressing problems related to sexuality is essential to promoting sexual well-being of individuals, couples, families, and communities.[16]

History

A sexual history is elicited as an essential part of a routine health history during an initial visit and annual visits thereafter. Questions regarding sexual orientation and gender identity (SOGI) are increasingly recognized as vital in identifying the unique needs of patients while providing inclusive care. Basic questions regarding a patient's sex at birth, current gender identity, preferred pronouns, and relationship status (instead of marital status) can be included in the health history and may facilitate effective, respectful communication and improve healthcare practices for all.[28] Despite the importance of sexual health and patients' expressed desire to be queried about sexual issues, questions related to sexual health are infrequently raised during routine examinations.[29] Barriers identified by nurses include personal discomfort, lack of training, and lack of time; those identified by patients include personal discomfort and beliefs that their concerns would be dismissed and that it is the provider's responsibility to initiate the dialogue.[29-30]

The CDC drafted guidelines for sexual history taking and incorporates five areas that should be broached with patients; these are known as the "the five P's." These stand for *p*artners, *p*ractices, *p*rotection from infection, *p*ast history of infection, and *p*revention of pregnancy.[31] *Partners* includes the number and sexof the patient's sexual partners. *Practices* refers to safe sex practices. If the patient reports more than one partner in the past 12 months or if the patient has had sex with a partner who has other sex partners, the nurse should inquire about condom use. *Protection* refers to questions assessing measures that the patient takes to protect himself or herself from STIs. This may include exploring about abstinence, monogamy, and the patient's perception of his or her own risk or his or her partner's risk. These questions are helpful in assessing patient risk for STIs.

Typical health history questions for female patients include those about menarche, menstruation, pregnancy, contraception, and menopause; for male patients, questions include those about contraception, penile discharge or lesions, scrotal pain or swelling, alterations in urine elimination, and andropause. Questions about practices for both sexes include those regarding safer sex knowledge and practice, frequency of intercourse, number of partners/lifetime partners, sexual behaviors, preferences, sexual response, and personal safety. Recall it is important to discuss sexual behaviors separately from sexual identity and orientation, as identity and orientation do not define risk.[11,31]

BOX 20.1 Common Medications that Reduce Sexual Desire or Response

- Antihypertensives (ACE inhibitors, β blockers, β agonists, diuretics)
- Antiulcer medications (cimetidine, omeprazole)
- Antidepressants
- Antipsychotics
- Anticonvulsants
- Diuretics
- Narcotics

ACE, angiotensin-converting-enzyme.

Examination Findings

The physical examination is guided by the sexual history and the patient's age, sex, and pertinent needs. A physical examination may or may not be a necessary component of nursing care as it relates to sexuality. For example, the report of genital pain will rely on the assessment techniques of history, inspection, and palpation, whereas a report of an alteration in sexual motivation or desire may not warrant physical examination.

Knowledge of the physical changes associated with normal growth and development is essential, and those associated with milestones such as puberty, pregnancy, menopause, and andropause are of particular interest as they relate to sexuality. Described as a sequence of physical changes, sexual maturation can be estimated based on the observed changes of primary and secondary sex characteristics: in females, breast development and pubic hair, and in males, genital development and pubic hair. Relying on a scale first suggested in the 1960s as an aide to quantify these physical changes is commonly referred to as "Tanner staging," named after the physician who first proposed it.[32]

Female Physical Examination

The first genital exam should occur at birth with the infant girl in a supine position; it is a relatively easy and noninvasive assessment. A general assessment of the vulva will include inspection of the labia majora, labia minora, clitoris, urethral opening, introitus, hymen, perineum, and anus. The initial assessment should confirm the sex of the infant and the patency of the urethra and anus; this is baseline data. Nurses observe for the passage of urine and meconium to confirm patency of the urethra and anus. Throughout childhood, the sexual history will guide the appropriate physical examination.

The gynecologic examination, generally associated with puberty and beyond, includes inspection and palpation of the external genitalia, internal inspection of the vagina per speculum, collection of specimens as indicated (swabs for cervical smears and STI screening), and bimanual palpation (pelvic exam) if indicated; a rectal exam may be performed if indicated. Physical findings might include the following: healed scars from

childbirth or trauma, hymenal tags, bulges (cystoceles or rectoceles), thinning of the vaginal wall, fistulas, masses, lesions, and inflammation. An annual gynecologic exam typically includes a clinical breast exam as well.[33]

Male Physical Examination

The first genital exam should occur at birth with the infant male in a supine position. A general assessment will include inspection of the penis, testes, scrotum, perineum, and anus. The initial assessment will confirm the sex of the infant, patency of the anus, and the location of the urinary meatus with any deviation (epispadias and hypospadias) documented; this is baseline data. Throughout childhood, the sexual history will guide the appropriate physical examination.

A general assessment of the male examination includes inspection and palpation of the penis, scrotum, testicles, perineum, and perianal area; a digital rectal examination (DRE) for assessment of the prostate may be indicated. The nurse should begin by examining the penis, scrotum, and testicles. The penis is inspected for discharge and lesions; the scrotum is inspected for lesions and contour. The testicles within the scrotal sac are palpated for size, texture, and tenderness, which may reveal such findings as hydrocele, masses, nodules, tenderness, or inflammation.[34]

Diagnostic Tests

Based on the patient's history and needs, a number of laboratory tests and diagnostic procedures may be indicated. Specimen collection from a variety of sources includes serum, urine, genital discharge/secretions, lesions, and semen. Diagnostic procedures include tissue biopsy, aspiration, ultrasound, x-ray, laparoscopy, colposcopy, and colonoscopy. Diagnostic testing may be performed for screening of genetic issues (ambiguous genitalia noted at birth), cancers (cervical, ovarian, prostate, and anus), infections (chlamydia, gonorrhea, syphilis, human papillomavirus [HPV], and HIV), and hormonal states (hypogonadism and pregnancy); the type of testing is best determined individually for each patient.

CORE COMPETENCIES

Sexuality

- Integrate evidence-based knowledge from nursing and other sciences as it relates to sexuality.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to sexuality.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to sexuality.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to sexuality.

CLINICAL MANAGEMENT

Primary Prevention

Patient education, counseling, and referral are essential components of health promotion and disease prevention for optimal sexual well-being. Focused areas of discussion include abstinence, contraception, safer sex practices, STIs, healthy relationships, and community resources. Although a great diversity of opinion exists regarding how to address sexuality issues in the United States, two common themes have been identified that support a communication framework for sexual health. The first theme is about protecting health through making good choices with regard to sexual behavior. The second theme supports broadening sexual health programs to go beyond disease control prevention to include wellness-related approaches to promote sexual health.[34]

Another primary prevention strategy is vaccination. HPV is a sexually transmitted pathogen that can infect the anogenital and oropharyngeal areas; infection can present asymptomatically (detected through cervical screening), or as visible warts. Virtually all cervical cancers are a result of persistent infection with a high-risk HPV type, short for genotype (types 16 and 18), and 90% of visible warts are related to low-risk types (types 6 and 11). HPV vaccines will prevent infection, though it will not treat preexisting disease, thus, it is optimal to vaccinate prior to exposure to the virus. While most sexually active adults have already been exposed to HPV of some type, vaccination remains a consideration as there are several types of the virus. Having a new sex partner is a risk factor for HPV infection at any age. HPV vaccination, considered to be safe and effective, is given as a series of two or three doses, depending on when vaccination is initiated. The series can be initiated as early as age 9 and is recommended for everyone through age 26. Vaccination for those older than 26 years may be appropriate based on an individual's personal history. While three HPV vaccines have been developed, since 2017, only one vaccine, the HPV-9-valent (types 6, 11, 16, 18, 31, 33, 45, 52, 58), is available in the United States, providing broader coverage than the other vaccines available elsewhere, a bivalent (types 16, 18) vaccine or quadrivalent (types 6, 11, 15, 18) vaccine.[26]

Secondary Prevention (Screening)

In contrast to primary prevention strategies, secondary prevention attempts to diagnose an existing disease in its earliest stages. This is referred to as screening with a goal of reducing morbidity and mortality and preserving quality of life.

Screening for Sexually Transmitted Infection

There is limited consistency in the literature regarding screening recommendations. The U.S. Preventive Services Task Force (USPSTF) recommends screening based on level of risk.[35] Level of risk is based on sexual behavior and includes unprotected intercourse, having sex with multiple partners, adolescent-onset intercourse, sharing of intravenous needles, and history of STIs. Individuals in a mutually monogamous relationship are considered low risk. For individuals who are at increased risk, periodic screening for chlamydia, gonorrhea, syphilis, and HIV is recommended; specific screening intervals vary, but it is common for screenings to occur as part of an annual pelvic examination.

Screening for Intimate Partner Violence

The USPSTF recommends that all women of childbearing age (14 to 46 years) be screened for intimate partner violence,

whereas others advocate for universal screening of patients across the life span.[36] Available screening instruments, including the Hurt, Insult, Threaten, Scream (HITS) screening tool, have been determined to be valid and reliable in the detection of current, past, and risk for abuse in clinical settings. Adequate evidence supports that effective interventions can reduce violence, abuse, and physical or mental harms for women of reproductive age.

Collaborative Interventions

A number of interventions are indicated for individuals experiencing a wide range of sexual problems and disorders.

Pharmacotherapy

Antibiotics. Infections of the reproductive tract are usually caused by STIs. A wide range of antibacterial, antiviral, and antiprotozoal agents are used in the treatment of STIs depending on the microorganism involved.

Hormone replacement therapy. Hormone replacement therapy (HRT) is often used to treat the symptoms of menopause in females—most notably hot flashes, night sweats, and vaginal dryness—and symptoms of hypogonadism in males—decreased strength, endurance, and libido and ED. HRT regimens prescribed may include estrogen, progesterone, and testosterone for females, and testosterone for males. Each HRT regimen has varied doses and routes (oral, sublingual, topical, pellet, injection) customized to the patient, the indication, and the presenting symptoms. HRT must be considered for the premenopausal female who undergoes hysterectomy with oophorectomy for optimal health, beyond periods and pregnancy. Transgender patients, too, will need hormone replacement to meet specific needs and goals of successful transitioning.

Phosphodiesterase-5 inhibitors. Two phosphodiesterase-5 (PDE-5) drugs (sildenafil and vardenafil) represent the first-line treatment for ED. These drugs act by relaxing smooth muscles in the corpora cavernosa of the penis to increase blood flow and compressing the veins in the corpora to reduce outward blood flow. These combined actions result in penile erection with sexual stimulation.

Surgical Procedures

There are indications for surgical procedures for men and women who are experiencing certain sexual problems.

Hysterectomy. A hysterectomy is the surgical removal of the uterus and may be indicated for a variety of uterine conditions, including menorrhagia, pelvic pain from endometriosis, prolapse of the female reproductive organs (uterus, cystocele, and rectocele), uterine fibroids, myomas, and cancer.

Penile implant surgery. Penile implant surgery involves the insertion of an inflatable device in the penis with a reservoir placed in the scrotum. The device is inflated by squeezing the reservoir. This procedure has become much less common since the introduction of pharmacotherapy for ED. Typically this procedure is done in cases where less invasive treatments are not successful.

Gender affirmation surgery. A person with gender dysphoria experiences a conflict between sex assigned at birth, male and female (biologic sex), and the gender with which the person identifies, for example: "*I am a girl locked in a boy's body*." Increasing numbers of patients, having initiated the indicated hormone therapy, seek gender affirmation surgery to align anatomical sex with gender identity; these are our transgender patients. Providing an integrated clinical program, including a multidisciplinary team, devoted to the holistic health of the person is essential.[37]

Minor procedures. Other surgical procedures include removal of genital lesions (e.g., warts or polyps) or incision and drainage for cysts or abscess.

Cognitive–Behavioral Therapy

For some individuals, cognitive–behavioral therapy (CBT) and sexual counseling have proven effective in the treatment of sexual problems with psychological origins, including some cases of ED. Many psychological and emotional factors, such as fear, anxiety, fatigue, and reproductive health concerns, can impair sexual performance. Individuals with sex addictions may also benefit from CBT.

Other Interventions

An alternative to PDE-5 in the treatment of ED is the vacuum construction device. This is an external cylinder-like device that fits over the penis and uses a vacuum effect to draw blood into the penis to gain an erection. A tension band is placed at the base of the penis to maintain the erection once the cylinder is removed, allowing the individual to have sex. The ring is removed within 1 hour.

INTERRELATED CONCEPTS

The concept of sexual health represents the "integration of somatic, emotional, intellectual, and social aspects of sexual being in ways that are enriching and enhance personality, communication and love."[1] Sexuality and interrelated concepts are presented in Fig. 20.3. This model illustrates some concepts that may be affected by normative sexual functioning and/or have an effect on sexuality.

Reproduction and reproductive health are highly interrelated to sexuality. By definition, they include topics of puberty, contraception, STIs, safer sex practices, fertility, infertility, and sexuality. Additional considerations for females are breast and cervical cancer screening, menstruation, preconceptual counsel and screening, pregnancy, and menopause.

One barrier to healthy sexual expression and function is **Pain**. Regardless of the source or type of pain the patient experiences, it can contribute to SD; pain can be chronic or acute, physical, psychological, or spiritual. For those in pain, sometimes the pain itself makes having sex not possible. It is noteworthy that both positive touch and sexual intimacy are known to stimulate the release of endorphins, the body's natural painkillers.

Medical conditions that lead to alterations in **Gas Exchange** (e.g., chronic obstructive pulmonary disease, cystic fibrosis, interstitial lung disease, and asthma) can lead to shortness of breath, fatigue, depression, and feelings of anxiousness and,

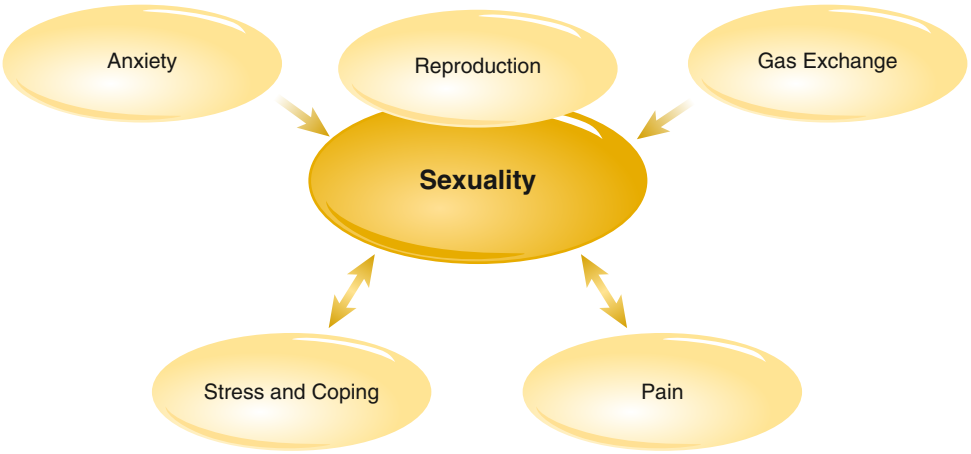

FIG. 20.3 Sexuality and Interrelated Concepts.

thus, can inhibit the human sexual response and can result in SD.[38] Individuals who rely on supplemental oxygen may experience impaired body image.

"Being present" is identified as a positive attribute of sexuality;[13] **Anxiety** can preoccupy the mind, body, and spirit. Patients with anxiety often present with concerns related to SD; those who seek care for SD often report feelings of anxiety. Anxiety is often linked to stress. If a patient is undergoing extreme stress from other life issues, this may have a negative effect on sexual function, particularly among those with insufficient coping strategies (**Stress and Coping**). Anxiety stimulates the sympathetic nervous system—the stress response is that of fight–flight–freeze—and negatively affects the sexual response cycle.[18]

CLINICAL EXEMPLARS

Any number of exemplars could be chosen to effectively illustrate the concept of human sexuality. Those presented in Box 20.2 address a continuum of concerns that have a significant effect on a person's sexual health and well-being across the life span.

Featured Exemplars

Erectile Dysfunction

ED is estimated to affect 18 to 30 million men in the United States; it is believed to be an underreported disease process as a result of embarrassment, shame, and lack of understanding of the condition. ED affects men of all ages and can be chronic or transient in nature. ED is positively correlated with age, cardiovascular conditions, risk factors, physical inactivity, alcohol use, smoking, and obesity; these conditions affect vascular perfusion, which is necessary for penile erection. For some men, there is an associated alteration in body image, self-concept, and self-esteem, all of which can be negatively affected by a perceived loss of manhood.[19,21]

Menopause

Menopause is associated with the cessation of ovulation. The age of onset is variable, with the average age at 51 years. Common symptoms include hot flashes, night sweats, impaired sleep, headaches, changes in memory, loss of sexual desire, urinary

BOX 20.2 Exemplars of Impaired Sexuality

Disorders Affecting Sexual Response

- Anorgasmia
- Coital incontinence
- Dysfunctional uterine bleeding
- Ejaculatory disorders
- Endometriosis
- Erectile dysfunction
- Hyposexual activity disorder
- Menopause
- Orgasmic disorder
- Pelvic organ prolapse
- Persistent genital arousal disorder
- Sexual arousal disorder
- Sexual aversion disorder
- Sexual pain disorder
- Vaginismus
- Vulvovaginitis

Sexually Transmitted Infections

Protozoa

- Trichomoniasis

Viruses

- Cytomegalovirus
- Hepatitis A and hepatitis B
- Herpes simplex virus 1 and 2 (HSV)
- HIV
- Human papillomavirus (HPV)

Bacteria

- Chancroid
- *Chlamydia*
- Genital mycoplasmas
- Gonorrhea
- Group B *Streptococcus*
- Syphilis

Other Exemplars

- Intimate partner violence
- Sexual violence
- Intersex

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

concerns, mood alterations, and dryness of skin and vaginal tissues.[39] In addition to managing symptoms, issues to be addressed include nutrition, bone health, heart disease prevention, weight management, hormonal balance, and cancer screening, along with psychosocial concerns of relationships, retirement, and available community support systems. Nurses have the ability to provide accurate information to patients regarding the physiology of menopause and its effect on sexuality.[39-40]

Pelvic Organ Prolapse

Symptoms of SD and altered body image often coexist with prolapse of the female reproductive organs (uterus, cystocele, and rectocele). Approximately 50% of women experience some degree of prolapse by the time they reach the age of 40 years.[39] Intercourse may be painful or embarrassing and associated with fecal or urinary incontinence. Conservative management includes lifestyle changes—such as losing weight, avoiding constipation, and reducing high-impact exercise (e.g., running)—and pelvic muscle floor training (Kegel exercises),[39-40] although surgical intervention may be necessary for advanced cases.

Intimate Partner Violence

Intimate partner violence is a serious, preventable public health issue that affects millions of Americans. The CDC defines intimate partner violence as:

> *actual or threatened physical, sexual, psychological, emotional, or stalking abuse by an intimate partner. An intimate partner can be a current or former spouse or nonmarital partner, such as a boyfriend, girlfriend, or dating partner. Intimate partners can be of the same or opposite sex.*[36]

It is clearly documented that intimate partner violence during adolescence is associated with negative biopsychosocial health effects, poor school performance, and a predisposition for sexual ill-being and problems in future relationships throughout life.[36]

Sexual Violence

Sexual violence is a public health issue throughout the world and is detrimental to the sexual well-being of an individual, a family, and a community. The CDC defines sexual violence as "a sexual act committed against someone without that persons' freely given consent."[36] Sexual violence includes child sexual abuse, intimate partner violence, incest, drug-facilitated sexual assault, sexual harassment, sexual exploitation, stalking, voyeurism, exhibitionism, frottage, and unwanted exposure to pornography.

Intersex

Intersex represents a group of conditions in which an infant's external genitals do not appear distinctly male or female or the external genitalia may not match the internal sex organs or genetic sex of the infant. This condition is confusing and distressing for families, as well as challenging for the healthcare team, which may have limited experience with and understanding of the condition. Medical care includes chromosomal analysis, endocrine studies, and radiologic studies to assist in guiding sex assignment. Physiologic complications of the condition of intersex include infertility and an increased risk of certain types of cancer.[37,40]

CASE STUDY

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Case Presentation

Anna Garner is a 44-year-old married female who has an appointment to see her nurse practitioner (NP) for her annual examination. As part of her annual physical, Anna will be having a pelvic examination, including a Papanicolaou test, to screen for cervical cancer. Anna has three teenage daughters, all born by spontaneous vaginal delivery. Several years ago, Anna returned to work full time at a rather sedentary job. Anna has found her weight to be increasing during these past few years and is now carrying 160 pounds at 5 feet, 4 inches tall. Throughout the years, Anna and her NP have developed a trusting and therapeutic relationship. As part of the history-taking process, the NP asks Anna if there have been any changes in the past year related to the sexual relationship that she has with her partner. Anna appears somewhat embarrassed; however, with some encouragement, she goes on to explain that in the past she and her husband have always enjoyed intercourse two or three times a week and that this is a very important part of their marriage. Anna states that for the past 9 or 10 months, she has begun to "lose urine" during intercourse. Sometimes this occurs during foreplay, and on other occasions it will happen during orgasm. Anna reports that she often interrupts their sexual activity to go to the bathroom. Recently she has been finding excuses to avoid sex altogether and is concerned that she is driving her husband away. The NP explains to Anna that this condition is referred to as "stress or coital incontinence" and may be the result of childbearing, aging, and her recent weight gain. Education is provided regarding the necessity for urodynamic evaluation and the possible treatment modalities available. Anna is instructed on how to perform Kegel exercises. The NP reassures Anna that although this condition is neither uncommon nor life-threatening, if left untreated it may result in other unanticipated symptomatology, including depression, loss of self-esteem, altered body image, worsening of incontinence, reduced social interaction, and decreased sexual interest and activity. Anna is very reassured by this education and agrees to the treatment plan.

Case Analysis Questions

1. What risk factors does Anna have for impairment in sexual health?
2. Review Fig. 20.3. Which concepts are associated with Anna's case? What other interrelated concepts are evident?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 21

Immunity

Lathika Mohanraj

The ability of the human body to sustain health requires multiple protective mechanisms, and the immune response is one of the most complex mechanisms. When immune processes are functioning optimally, the body can mount an efficient defense—a response critical to maintaining health. It is reasonable, then, to infer that multiple health problems occur due to the dysregulation of a normal immune response. Here we describe the concept of Immunity from the perspective of both normal and abnormal functioning; however, the primary focus is on abnormal immune responses that can lead to a multitude of health-related concerns.

DEFINITION

Immunity is usually defined as a physiologic process that provides an individual with protection against or defense from disease. It is a characteristic that allows one to fight against a particular disease or condition and is a term derived from the Latin word *immunis,* meaning exempt.[1] Immunity is conferred by a complex group of cells, tissues, and organs that work in a dynamic manner to protect the body from foreign toxic substances and pathogens. These foreign antigens may include disease-producing microorganisms (bacteria, viruses, parasites, or fungi) and/or proteins found in pollen; different types of food; bee, snake, or spider venom; vaccines; transfusions; and transplanted tissues.[2] For the purpose of this concept presentation, a broader definition of immunity is used: *the normal physiologic response to disease-causing microorganisms and toxic substances as well as conditions associated with an suppressed or exaggerated immune response.*

The human body is protected by two different types of immunity. *Innate immunity* (also referred to as *natural* or *native*) is present at birth, elicits an immune response that is not antigen-specific, and includes natural barriers and inflammation. *Adaptive immunity* refers to immunity that is slow but specific and involves the formation of antibodies (humoral immunity) or sensitized T lymphocytes (cell-mediated immunity). Adaptive immunity can either be passive or active. Active immunity is produced by the human body as a response to immunizations or due to natural exposure. *Passive immunity* occurs by the introduction of preformed antibodies or transferred T lymphocytes—either artificially or naturally across the mother's placenta to the fetus and via breast milk after birth.[3,4]

SCOPE

Viewing immunity in the context of patient-related health concerns helps us understand this challenging concept. The scope of immunity and related problems are described as optimal and abnormal responses (Fig. 21.1). An optimal response represents an immune system that protects the body from the invasion of microorganisms, removes damaged tissue and cells, and recognizes cellular abnormalities and mutations. Abnormal immune functions include either a suppressed/deficient immune response or an exaggerated/inappropriate immune response.[2]

To the far left of the immune response spectrum (see Fig. 21.1) is a suppressed immune response or an immunodeficiency (failure of normal immune response). These individuals are usually at a significant risk for recurrent infections.[5,6] To the far right of the immune response spectrum (see Fig. 21.1) are hypersensitivity reactions with an exaggerated immune response. Hypersensitivity reactions include allergic, autoimmune, and alloimmune reactions. Allergic reactions occur when the body responds to antigens in the environment, autoimmunity occurs when the body's immune response is triggered against the body's own tissues, and alloimmunity is when the body elicits a response against tissues from another donor.[4,5]

NORMAL PHYSIOLOGICAL PROCESS

The immune response comprises of the following primary protective functions: (1) protects the body from disease-causing microorganisms and other foreign substances; (2) removes dead or damaged tissue and cells; and (3) recognizes and destroys abnormal cells, such as tumor cells or cells infected with virus. To accomplish normal physiologic functions, the immune system includes three lines of defense. The first line of defense is the outer epithelium that includes the skin surface, mucous membranes and biochemical barriers. The second line of defense is inflammation that involves a nonspecific, rapid

Fig. 21.1 Scope of Concept: Immunity.

activation of biochemical and cellular processes. The first line of defense along with inflammation is referred to as innate immunity. Finally, the third line of defense is the adaptive immunity that consists of antibodies from plasma cells (derived from B lymphocytes) and the T lymphocytes.[5]

Key Components of the Immune System

Cells of the immune system arise from hematopoietic stem cells that reside within the bone marrow and begin as either myeloid or lymphoid progenitor cells. Myeloid progenitors generate monocytes (that differentiate to macrophages in body tissues), neutrophils, eosinophils, basophils, and mast cells. Lymphoid progenitor cells generate B lymphocytes, T lymphocytes, and natural killer cells.[5-7] Select cells are discussed below.

Phagocytes

Phagocytosis is the process of engulfing and disposing abnormal cells and foreign substances. Monocytes/macrophages and neutrophils are the two primary phagocytes in the human body. Monocytes enter the blood from the bone marrow. They then infiltrate various tissues in the body and evolve into macrophages serving as the principal scavengers of the body. They are required for the activation of T lymphocytes. Neutrophils also play an important role in phagocytosis during the initial phase of inflammation.

Antigen-Presenting Cells and the Major Histocompatibility Complex (MHC) Proteins

Phagocytic cells such as macrophages, dendritic cells, and B cells are called *antigen-presenting cells (APCs)*. These cells process the antigens and present them to the lymphocytes to initiate an immune response. Dendritic cells serve as guards throughout the body as they look for foreign antigens and alert lymphocytes to the presence of injury or infection. Once antigens are processed by APCs, they are presented on the cell surface by glycoproteins called major histocompatibility complex (MHC) molecules. There are two classes of MHC molecules; class I is found on all nucleated cells and platelets, and class II is found on specialized cells. MHC proteins function, in part, to differentiate cells of the self/host from foreign proteins. Substances that are "nonself" are capable of initiating an immune response. A foreign antigen may be a pathogen or a small portion of a larger foreign protein. The MHC provides a "scaffold" that presents the foreign antigen to the immune cells.[2]

B and T Lymphocytes

Lymphoid stem cells from the bone marrow enter the central lymphoid organs (thymus and bone marrow) where naïve T and B cells are produced and released into circulation. Through blood and lymphatic vessels, they move to secondary lymphoid organs (such as lymph nodes and spleen). Once they encounter an antigen, these naïve lymphocytes differentiate into mature T and B lymphocytes that are antigen-specific or play a role in cell-mediated and humoral immunity, respectively. A general overview of immune system development and maturation leading to an immune response to a foreign antigen is presented in Fig. 21.2.

Role of B Lymphocytes: Antibody Production. Antibodies are soluble proteins that mediate humoral immunity. When a B lymphocyte encounters an antigen, it differentiates to form a plasma cell, which is a powerhouse for antibody production. Each plasma cell is specific to an antigen and dedicated to secrete a single class of antibody. There are five classes of antibodies or immunoglobulins found in various concentrations at different sites throughout the body:[5]

- IgG: Primary immunoglobulin in the blood (80% to 85% of circulating immunoglobulins); may enter tissue spaces; selectively crosses the placenta; coats antigen for more effective and efficient presentation for an immune response; binds to macrophages and neutrophils for increased phagocytosis
- IgD: Found within the cell membrane of B lymphocytes
- IgE: Responsible for allergy symptoms and increases in the presence of parasitic worms; normally found in trace amounts
- IgA: Protects entrances to the body; found in high concentrations in body fluids (tears, saliva, and secretions of the respiratory and gastrointestinal tracts)
- IgM: Remains in the blood and efficiently kills bacteria; largest of the immunoglobulins; first antibody produced with an initial (primary) immune response

Role of T Lymphocytes. T lymphocytes are primarily involved in adaptive immunity. T lymphocytes undergo differentiation on exposure to a foreign antigen, developing into subtypes of cells that may directly attack the antigen or stimulate the activation of other lymphocytes. T lymphocytes (or T cells) are classified into three primary groups: helper T cells, cytotoxic T cells, and suppressor T cells. Helper T cells (CD4 cells) comprise approximately 75% of all T lymphocytes. They help differentiation of B cells into plasma cells and differentiation of naïve T cells into cytotoxic T cells. They also play a role in accelerating inflammation and increasing phagocytosis. Cytotoxic T lymphocytes attack and kill antigens directly, with preference for virus-containing cells or tumor cells.[5-7] Suppressor T cells (also known as T-regulatory cells) usually control and suppress an immune response and maintain self-tolerance.[5]

Plasma Protein Systems

Though inflammation is not the focus of this concept, the plasma protein system deserves mention because it is an essential part of an immune response. Plasma protein systems consist of three key cascades, i.e., the complement system, the clotting system, and the kinin system. When the complement system is activated, it produces components that destroy disease-producing microorganisms. It activates and coordinates with both innate and adaptive immune responses. The clotting or the coagulation system, when activated, results in the formation of blood clots. And finally, bradykinin, which is the main product

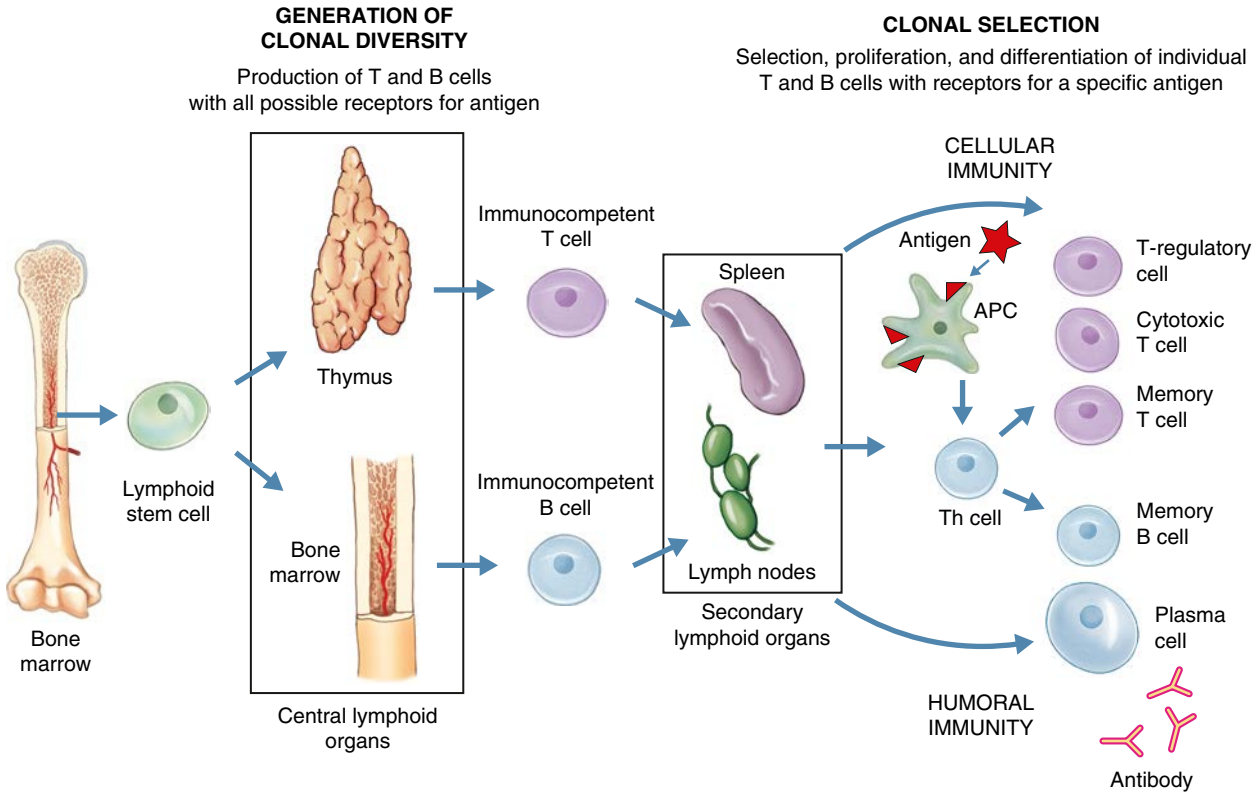


Fig. 21.2 Overview of Immune Response. (From McCance KL, Huether SE, Brashers VL, et al. [2014]. *Pathophysiology: The biologic basis for disease in adults and children* [7th ed.]. St Louis: Mosby.)

of the kinin system, plays a role in pain induction, vascular permeability, dilation of blood vessels, and chemotactic response. It is also important to note that these three plasma protein systems (complement, clotting, and kinin) are interactive and influence each other's functions.[5,8]

Age-Related Differences

The immune system changes throughout the life span from the *in utero* phase to the elderly. These differences could either be changes in components of the immune system or one's immune response to an exposure. Immune functions such as phagocytosis and antibody synthesis are not completely developed at birth. Early in life, the child is protected by maternal antibodies present in fetal circulation; however, gradually there is a decrease in maternal immunoglobulins and the IgGs are replaced with the child's IgGs. The immune system progressively matures during infancy and is supported by exposure to antigens (e.g., bacteria or virus) and vaccinations during childhood. With aging, a reduced cell-mediated response to pathogens is observed, resulting in an increased susceptibility to infection in addition to a decrease in specific antibody production. Autoimmune diseases are also prevalent in the elderly due to failure of self-antigen recognition. Older adults are at increased risk for impaired inflammation because of the likelihood of other existing comorbidities such as cardiovascular diseases and diabetes.

VARIATIONS AND CONTEXT

Alterations in immunity can be classified as those that result in an exaggerated/inappropriate response (i.e., hypersensitivity reactions) and those that occur due to failure of a normal immune response (i.e., suppressed immune response or an immunodeficiency). Immune alterations can manifest as minor symptoms (e.g., a runny nose [rhinitis]) or life-threatening consequences (e.g., anaphylaxis).

Immunodeficiencies/Suppressed Immune Response

An inadequately functioning immune system leaves the individual immunocompromised. Immunodeficiency is either classified as primary or secondary.

Primary immunodeficiency (PI) occurs due to genetic defects. These defects may be caused by deficiencies in the innate immune system, complement system, phagocytes, or antibody production. Examples of PI include DiGeorge syndrome, Wiskott-Aldrich syndrome, and mannose-binding lectin deficiency, among others. Individuals with PI usually tend to have recurrent infections such as abscesses, persistent fungal infections, and septicemia.[5,9] Hypogammaglobulinemia (common variable immunodeficiency) is one of the most prevalent PI diseases and is caused by defects in B cell function and antibody formation.[10]

Secondary immunodeficiency is a loss of immune function as a result of an illness or treatment. Various malignancies lead to secondary immunodeficiencies either due to cancer pathology or the treatments these individuals receive. Certain blood cancers such as multiple myeloma, Hodgkin disease, and non-Hodgkin lymphoma may directly lead to immune system dysfunction. Chemotherapy treatments and irradiation are not always specific to tumor cells and may also deplete the immune cells in the body. In some instances, medications that intentionally

TABLE 21.1 Immunologic Mechanisms of Tissue Destruction

Type	Name	Rate of Development	Class of Antibody Involved	Principal Effector Cells Involved	Complement Participation	Examples of Disorders
I	IgE-mediated reaction	Immediate	IgE	Mast cells	No	Seasonal allergic rhinitis
II	Tissue-specific reaction	Immediate	IgG IgM	Macrophages in tissues	Frequently	Autoimmune thrombocytopenic purpura, Graves disease, autoimmune hemolytic anemia
III	Immune complex–mediated reaction	Immediate	IgG IgM	Neutrophils	Yes	Systemic lupus erythematosus
IV	Cell-mediated reaction	Delayed	None	Lymphocytes, macrophages	No	Contact sensitivity to poison ivy and metals (jewelry)

Ig, Immunoglobulin.
From McCance, K. L., Huether, S. E., Brashers, V. L., et al. (2014). *Pathophysiology: The biologic basis for disease in adults and children* (7th ed.). St Louis: Mosby.

suppress the immune system are used. Immunosuppressants (e.g., corticosteroids) are used to treat hypersensitivity reactions and prevent rejections after organ transplant or hematopoietic stem cell transplant.

Exaggerated/Inappropriate Immune Response

An exaggerated or inappropriate immune response is classified into four classes of hypersensitivity reactions:

- Type I, IgE-mediated or atopic (allergic)
- Type II, tissue-specific or cytotoxic
- Type III, immune complex-mediated
- Type IV, cell-mediated or delayed hypersensitivity

The pathology associated with hypersensitivity reactions is summarized in Table 21.1.

Type I hypersensitivity reactions are IgE-mediated and allergic reactions to environmental antigens often result in type I reactions. Most allergies to food and medications fall under this category. Type II hypersensitivity is mediated by immune reactions that involve antibodies against specific antigens on the cell surface. Examples of type II hypersensitivity reactions include Graves disease and reaction to certain drugs. Formation of antigen-antibody complexes in circulation that are deposited on tissues lead to type III hypersensitivity reactions. Serum sickness and systemic lupus erythematosus (SLE) are examples of type III hypersensitivity reactions. Type IV cell-mediated hypersensitivity responses are due to T lymphocyte activity that result in tissue destruction. Contact dermatitis caused by poison ivy is an example of type IV hypersensitivity.

When the immune system inappropriately elicits a response against the body's own cells, it is referred to as autoimmunity. Autoimmune disorders can fall under any category of hypersensitivity reactions. With more than 80 autoimmune disorders already identified, an individual may have more than one autoimmune disorder simultaneously.[11] The degree of destruction and functional loss varies dramatically and depends on the type of autoimmune disorder, age, overall physical and nutritional health, and treatment. Some of the more commonly occurring autoimmune diseases include rheumatoid arthritis, SLE, multiple sclerosis, Graves disease, and diabetes mellitus. Genetic predisposition is an important factor in the development of autoimmune diseases, with manifestation of the disease often associated with some type of environmental trigger such as bacterial or viral infections or physiologic or environmental stressors.[2,5,12]

CONSEQUENCES

Consequences of Immunodeficiencies/Suppressed Immune Response

The most common concern with immunosuppression or immunodeficiency is an increased risk of recurrent and persistent infections. Development of superinfections such as methicillin-resistant *Staphylococcus aureus* (MRSA) or *Clostridium difficile* (*C. difficile* or *C. diff.*), or the development of treatment-resistant fungal infections secondary to antibiotic treatment for primary bacterial infections occur frequently.[13,14] Certain infections can also result in inflammation of organs leading to suboptimal organ function.

Consequences of an Exaggerated/Inappropriate Immune Response

The consequences of an exaggerated/inappropriate immune response truly depend on the organ system(s) involved. For example, allergens that trigger a response in the mucous membranes of the nose or lungs can present as rhinitis or asthma, respectively. Antibodies against hematopoietic cells such as red blood cells can result in destruction of these cells causing anemia. Hypersensitivity reactions to environmental antigens such as poison ivy results in contact dermatitis—a lesion only at the site of contact. And there are autoimmune disorders such as SLE that produce antibodies against a variety of autoantigens capable of damaging select tissue and organs (e.g., kidneys, heart, and lungs), in some cases also leading to organ failure.

RISK FACTORS

Immunodeficiency/Suppressed Immune Response

Age

Though age-related changes in immune response are part of normal physiology, age is certainly considered a risk factor. During infancy, the immune system is immature with inadequate lymphocyte function—particularly T-lymphocyte deficiency. Newborns rely on immune protection from the mother through placental blood transfer and the high levels of immunoglobulin

found in colostrum during breast-feeding. During the next few months, maternal antibodies are slowly destroyed, with the rate of catabolism exceeding the rate of newborn immunoglobulin production. In the elderly, loss of immune effectiveness occurs in part due to physiologic aging and shrinking of the thymus gland, decreasing optimal T-lymphocyte function.[15] Research has also demonstrated that the elderly have fewer T lymphocytes, produce less immunoglobulins, experience a delayed and diminished immune response, and demonstrate an increase in autoantibodies.[2,5,15] B-lymphocyte function gradually decreases as a result of a reduction in circulating memory cells.

Nonimmunized State

Individuals who are not immunized are susceptible to a number of infections including rubella, measles, mumps, tetanus, diphtheria, and hepatitis. Many of these diseases can be fatal to the very young, the elderly or those who are immunocompromised as a result of disease process or their treatment and other environmental factors.

Environmental Factors

Environmental factors such as poor nutrition, exposure to pollutants (including tobacco smoke) or heavy metals, and other stressors may depress immune functioning. Exposure to ultraviolet light (e.g., from sunlight or tanning beds) can also suppress our defenses against tumors and malignancies.[5,16]

Chronic Illness

Immunosuppression can also develop due to chronic illness. In addition to primary immunodeficiencies that directly impair the immune system (e.g., human immunodeficiency virus [HIV]), many chronic conditions (e.g., diabetes mellitus, chronic obstructive pulmonary disease, malnutrition, and cancer) also lead to a decline in immune function, secondary to disease.

Medical Treatments

Immunosuppressive therapies are intentionally used to suppress the immune system either to inhibit an autoimmune response or a hypersensitivity reaction. These treatments could be administered for various malignancies and/or to prevent transplanted tissue rejection. Though this is appropriate and deemed necessary for specific conditions, one needs to maintain a balance to ensure that the treatment benefits outweigh the risk. Psychological and physical stress associated with treatments, place an added burden on the immune system and may leave the individual vulnerable to disease.

Genetics

Though rare, most primary immunodeficiencies (PIs) are caused by mutations that are sporadic and occur before birth. Common variable immunodeficiency is probably the most common PI seen in older children and adults, with varying incidence based on the population.[17] Genetics, along with the individual's overall health and existing comorbidities, influence their immune functioning.[18] Racial, ethnic, and socioeconomic disparities have been noted in the diagnosis and management of PI; however, the underlying role of genetics, if any, has not been thoroughly explored.[19]

High-Risk Behaviors

High-risk behaviors, such as intravenous drug abuse, sexual activity, and alcohol consumption, have been associated with immune system dysfunction. Secondary immunodeficiencies such as acquired immunodeficiency syndrome (AIDS) develop due to a viral infection that is bloodborne. Intravenous drug abuse, sharing of needles, and high-risk sexual behaviors can increase transmission risk of HIV. Excessive alcohol consumption leads to compromised immunity (innate and acquired), dysfunction of components of the immune system, and increases the risk of infection.[20]

Exaggerated/Inappropriate Immune Response

Sex, Race, and Ethnicity

Sex, race, and ethnicity may have an influence on the incidence of certain hypersensitivity disorders. For example, SLE occurs more often in women than in men (10:1 ratio), African Americans are eight times more likely than white non-Hispanics to contract the disease, and Asians have a higher incidence and severity of organ damage from SLE than individuals of European descent.[5]

Genetics

Genetic factors often contribute to the development of autoimmune disorders. They can be familial in nature or allele-specific, such as alleles of the MHC gene. In some cases, the genetic basis for the development of hyperimmune disorders require that the gene or chromosome be carried by both parents (or sometimes by one parent alone), and others require an environmental or physiologic trigger in addition to the genetic predisposition to hyperimmune disorders.

Repeated Environmental Exposure

As discussed earlier, foreign antigens (environmental or medication exposure) may elicit an exaggerated immune response. Foods, drugs, pollen, dust, vaccines, or serum may all evoke hypersensitivity reactions (types I, II, or III).[2,4,5] In most cases, these hypersensitivity reactions may not occur on first exposure to the foreign antigen but rather on reexposure. Individuals who manifest an allergic response to one type of antigen (e.g., pollen) may demonstrate a similar reaction to other antigens in the same or similar class.

ASSESSMENT

Assessment of immune response and dysfunction begins with a thorough health history and physical examination. Basic laboratory and diagnostic testing procedures are followed with more specific tests depending on the individual's health history and symptoms they present. Additional genetic testing to confirm a diagnosis, consultation with specific experts in the field, and needs assessment for personalized counseling may also be conducted.

History

The health history is useful to determine a patient's risk for an altered immune response and to determine whether symptoms described link to abnormalities in the immune system. This should include current and past medical health problems and associated treatments, especially conditions associated with the immune system (e.g., persistent infections) (see Box 21.1 later in the chapter). The patient should be asked about allergies to substances and their severity, as well as the patient's response to the allergen. A thorough inventory of patient's current medications and vaccination history is necessary. Patient assessment should include nutritional assessments, dietary intake, energy levels, and recent weight changes. Associated health concerns include health problems during pregnancy, wound healing, conditions causing significant or consistent psychological stress, exposure to environmental agents or stressors, physical trauma, and a history of exposure to microorganisms that are associated with immune dysfunction (Epstein-Barr virus, HIV, cytomegalovirus, herpes simplex virus type 6, hepatitis B virus, etc.).

Examination Findings

Examination findings indicative of immune status are presented from the perspective of normal (optimal) immune functioning, suppressed immune functioning, and exaggerated immune functioning.

Clinical Findings: Immunodeficiencies/Suppressed Immune Function

The incidence of recurrent, severe infections is a classic initial presentation of immunodeficiencies. Multiple occurrences of pneumonia, septicemia, and infections caused by rare opportunistic microorganisms are some examples. The type of infection may be indicative of the immune defect. Other findings may include malnourishment, weight loss, generalized fatigue or malaise, and impaired wound healing.

Clinical Findings: Exaggerated/Inappropriate Immune Function

Clinical findings are associated with the type of hypersensitivity reactions and/or autoimmune disorder. Type I hypersensitivity reactions typically manifest in tissues such as the respiratory tract, skin, and gastrointestinal system, and, therefore, symptoms presented may be indicative of the tissue affected such as rhinitis, hives, and diarrhea, respectively. Allergic responses may vary from mild symptoms to life-threatening anaphylactic reactions. Clinical manifestations of other immune complex and autoimmune disorders are often vague (fever, pain) and less obvious but capable of affecting multiple organ systems. Symptoms may become more apparent when system function is impaired. For example, cardiovascular symptoms may include pericarditis, congestive heart failure, pulmonary or peripheral edema, and anemia. Renal symptoms will range from no symptoms, acute kidney disease to chronic renal failure, and end-stage renal disease. Musculoskeletal manifestations can include joint pain and inability to control movements, including walking, as seen with multiple sclerosis. However, there are some autoimmune disorders that have classic findings such as a subtle butterfly rash across the nose and cheeks associated with SLE.

Diagnostic Tests

Primary Testing

Laboratory and diagnostic testing begin with basic blood tests to determine red blood cell and white blood cell counts with differential evaluation. A fluorescent antinuclear antibody test is standard in the evaluation of potential autoimmune diseases. Screening tests—C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR)—may also be completed. CRP is a known biomarker for inflammation in the body; however, elevated CRP levels are associated with various disorders and not indicative of a specific immune dysfunction. It may also be used to follow disease progression and response to treatment for diseases such as rheumatoid arthritis, SLE, and other autoimmune disorders. An ESR is useful in monitoring inflammatory or cancerous diseases, rheumatoid arthritis, and autoimmune diseases.[21]

Allergy Testing

Allergy testing is often important in diagnosis, and it usually consists of a skin test, an allergen-specific immunoglobulin (IgE) blood test, or both. Skin testing identifies the individual's sensitivity to a specific allergen, and the IgE blood test measures IgE levels in the blood; higher levels typically correspond to a more severe allergic response. Circulating blood levels of IgM and IgA may also be measured.

Advanced or Disease-Specific Testing

After the initial screening and basic tests, specific blood testing may include cytogenic analysis to detect chromosomal instability, indicative of chromosomal disorders; DNA analysis to detect genetic mutations; and enzyme-linked immunosorbent assay (ELISA) to determine blood levels of IgG subclasses and IgG deficiency, if any. T-lymphocyte levels and proliferative response to antigen exposure testing helps determine T-cell capacity in an immune response. Rheumatoid factor is a blood test to determine the presence of antibodies against immunoglobulins and is evaluated in combination with other blood tests.[21] ELISA and confirmatory Western blot tests are conducted to confirm the presence of antibodies to HIV infection. The TORCH antibody panel searches for the presence of antibodies to toxoplasmosis, rubella, cytomegalovirus, and herpes simplex.[21] Complement system testing is done to determine the presence of deficiencies or abnormalities in complement proteins, addressing both quality and activity of the proteins. Deficiencies contribute to increased incidence and severity of infections and autoimmune dysfunction.

Tests of Organ Function

Organ function tests help assess specific organ functioning and help monitor the effectiveness of treatment regimens. These tests include hemoglobin A_{1c} level tests, hepatic function tests, renal function tests, and thyroid screening panels. In most cases, serial laboratory testing is recommended to assess both progression of disease and effectiveness of planned treatment strategies.

CORE COMPETENCIES

Immunity

- Integrate evidence-based knowledge from nursing and other sciences as it relates to immunity.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to immunity.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to immunity for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to immunity.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to immunity.
- Demonstrate clinical judgment founded on broad knowledge of immunity.

CLINICAL MANAGEMENT

The clinical management of individuals with immunosuppression or hyperimmune conditions varies widely depending on the type of condition, severity, and variables such as age, health status, and underlying medical conditions that should be considered during treatment planning.

Primary Prevention

Primary prevention includes addressing modifiable risk factors noted previously. Activities that minimize stress and certain practices, such as avoiding high-risk behaviors, minimizing exposure to environmental triggers, eating a balanced diet, and engaging in regular physical activity, address some of these modifiable risk factors. Achieving the daily recommended doses of vitamins (A and E) and minerals contribute to optimal functioning of the immune system and health maintenance. In individuals with an optimal immune system, infection prevention and/or decreasing the risk of a debilitating disease is achieved by active immunizations through vaccines. The Centers for Disease Control (CDC) Advisory Committee on Immunization Practices has established recommended vaccination schedules for children, adolescents, and adults, in addition to a "catch-up" schedule.[22,23] However, there may be additional factors that need to be considered in individuals with a dysfunctional immune system. For example, the elderly may need an increased vaccine dose to provide the same level of protection to a disease such as influenza. Individuals with immunodeficiencies should be cared for with the understanding that their immune systems may be ineffective, and, therefore, traditional immunizations may be unsafe and require thorough analysis of risks versus benefits.

Secondary Prevention (Screening)

Secondary prevention focuses on screenings for the presence or emergence of immune system disorders. There are screenings specifically directed at immune system dysfunction and additional screenings (e.g., HIV screening) are recommended for high-risk groups. Advances in genomic testing will be useful in developing personalized screening tests in the future for additional immune-related diseases.

Collaborative Interventions

Treating immune related disorders can be an extremely involved and complex process depending on the type of disease and its severity. Systemic disorders demand interprofessional and collaborative expertise for their symptom management. Often experts from different healthcare professions (such as dieticians, physiotherapists, and exercise physiologists) need to come together to draft a comprehensive plan that improves the quality of life of these individuals. An overview of selected clinical management strategies for the treatment of immune system diseases or dysfunction is provided in Table 21.2.

INTERRELATED CONCEPTS

The concept of immunity is closely related to the concepts of **Inflammation** and **Infection**. Overlap among these concepts exist in the areas of pathology, laboratory and diagnostic tests, clinical manifestations, nursing interventions, and clinical outcomes. A discussion of these related concepts is found in Concept 22, Inflammation, and Concept 23, Infection, respectively. **Tissue Integrity** is also closely aligned to immunity because an impairment in tissue integrity will cause infection and likely an inflammatory immune response. As a concept, **Stress and**

TABLE 21.2 Interventions in the Clinical Management of Immune Dysfunction

Suppressed Immune Response

Infection
- Clinical management of infection and opportunistic diseases is typically an important part of clinical care; interventions and clinical outcomes are discussed in Concept 23, Infection

Gastrointestinal dysfunction
- Pharmacologic treatment of diarrhea, candidiasis, and fluid and electrolyte loss

Skin disorders
- Pharmacologic treatment of skin rash (e.g., steroids, topical antifungal, and topical antiseptic)

Nutrition
- Multiple vitamin and mineral supplements
- Dietary supplements
- Evaluation of weight and BMI

Immunodeficiencies
- Pharmacotherapy (usually disease-specific): intravenous immunoglobulins

Exaggerated Immune Response

Anaphylaxis
- Support of airway, breathing, and circulation: subcutaneous epinephrine if type 1 reaction; other bronchodilators; intubation and ventilator support, circulatory volume expanders, and vasopressors to maintain blood pressure and circulating volume
- Pharmacotherapy: Epinephrine and bronchodilators as described previously
- Education: Avoiding contact with pathogen initiating anaphylactic response; proper use of an EpiPen for self-administration of epinephrine

Exaggerated immune response
- Pharmacotherapy: Corticosteroids, immunomodulators

Pain management
- Pharmacotherapy: NSAIDs, corticosteroids
- Maintenance of mobility and physical activity

BMI, body mass index; *NSAIDs,* nonsteroidal antiinflammatory drugs.

Coping is linked to Immunity because a stress response is associated with depressed immune function. Stress may also lead to changes in Glucose Regulation resulting in fluctuations in glucose levels mediated by various pathways. Resultant elevated blood glucose levels can exaggerate both inflammation and infections. Both inadequate Nutrition and extreme or prolonged Fatigue are stressors to the body, either of which may lead to a compromised immune system. Interrelationships are shown in Fig. 21.3.

CLINICAL EXEMPLARS

B- or T-lymphocyte dysfunction, hypersensitivity reactions, complement dysfunction, or dysfunction of more than one component are examples of immune-related diseases. Box 21.1 provides a brief overview of some common diseases that may lead to an immunocompromised state. Immune disorders are unique to each individual and require a thorough review of health history, presenting symptoms, and laboratory and diagnostic data prior to establishing a comprehensive nursing care strategy.

Featured Exemplars

Hodgkin and Non-Hodgkin Lymphoma

Hodgkin and non-Hodgkin lymphoma are cancers that originate in the lymphatic system and are associated with abnormal T cells and B cells. Non-Hodgkin lymphoma is more common than Hodgkin lymphoma, and symptoms include swollen lymph nodes in the neck, axilla, or groin; abdominal pain; persistent fatigue; fever and chills; night sweats; and weight loss. Most people diagnosed with non-Hodgkin lymphoma have no obvious risk factors. Some factors that may increase the risk include a weakened immune system, infection with select bacteria or viruses, and older age (>60 years).[30,31]

BOX 21.1 EXEMPLARS OF INEFFECTIVE IMMUNITY

Suppressed Immune Response

- Classic complement pathway deficiency
- Deficiencies of immunoglobulin A, G, D, or M
- DiGeorge syndrome
- HIV
- Hodgkin and non-Hodgkin lymphoma
- Plasma cell disorders
- Primary immunodeficiency
- Severe combined immunodeficiency

Exaggerated Immune Response

Allergic Responses

- Allergic reaction
- Allergic rhinitis
- Anaphylaxis
- Asthma

Autoimmune Responses

- Autoimmune thrombocytopenic purpura
- Crohn's disease
- Diabetes mellitus (type 1, insulin-dependent)
- Glomerulonephritis
- Graves' disease
- Multiple sclerosis
- Myasthenia gravis
- Rheumatoid arthritis
- Systemic lupus erythematosus
- Ulcerative colitis

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

HIV Disease

HIV, a retrovirus, leads to the destruction of CD4 T cells. This affects the normal functioning of the immune system, and the

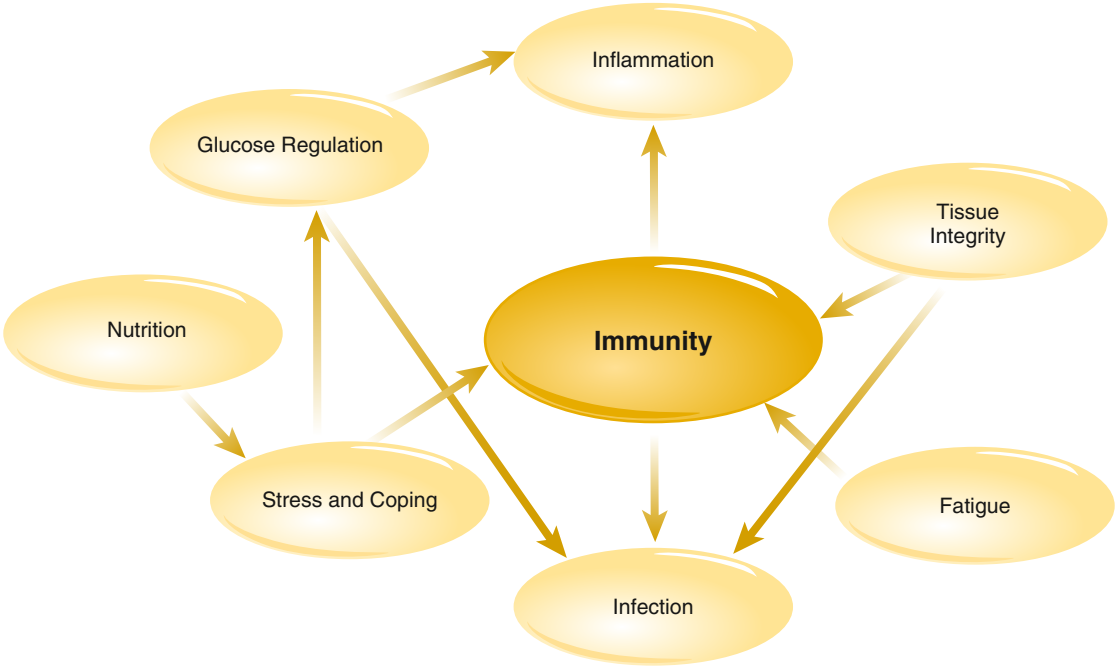


Fig. 21.3 Immunity and Interrelated Concepts.

infected individual is in an immunocompromised state, increasing their risk for opportunistic diseases and infections. CD4 or "helper" T cells are critical in the overall functioning of the immune response, and progressive decrease of CD4 count to <200 cells/μl in infected individuals is defined as AIDS.[32,33] Symptoms commonly observed during the initial stages of an HIV infection include fever, headache, muscle pain, skin rash, and lymphadenopathy. Treatment goals include reduction in HIV viral load, prevention of HIV transmission, and reducing HIV-related complications.

Allergic Rhinitis

Allergic rhinitis, commonly referred to as "hay fever" or "pollen allergy," may also be associated with food allergies, atopic dermatitis (eczema), or asthma. Allergic rhinitis is common in all age groups and is observed in approximately 10% of children younger than 18 years of age. The condition is often seasonal, and symptoms typically include inflammation of the nasal passages, resulting in runny nose, sneezing, nasal congestion, and itchy, red, watery eyes. Hyposensitization by injection of a diluted form of the antigen may be a necessary part of the treatment regimen.[1,34]

Systemic Lupus Erythematosus (SLE)

SLE is a chronic, inflammatory autoimmune disease with no cure that affects multiple body organs and systems, including joints, skin, kidneys, blood cells, brain, heart, and lungs. The most obvious sign of SLE is a butterfly-shaped facial rash that spreads across the cheeks and bridge of the nose. This rash is present in most, but not all, cases of SLE. As an autoimmune disease with an exaggerated response, immune cells attack "self," damaging or destroying multiple organs with periods of flare and remission.[35]

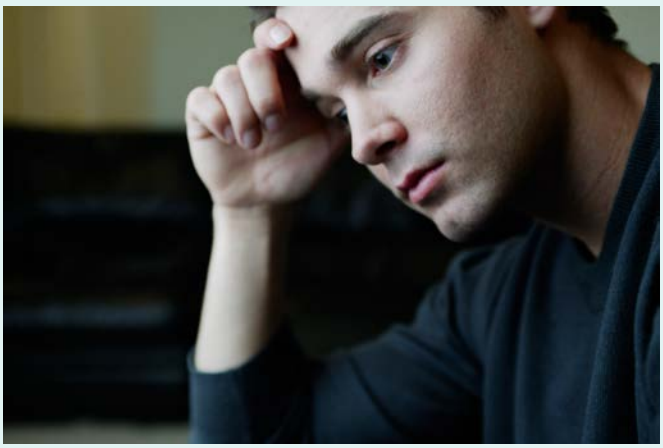
Type 1 Diabetes Mellitus

Type 1 diabetes mellitus, another autoimmune disease, typically manifests in young people, although it can occur in adults, causing hyperglycemia as a result of less or no insulin due to destruction of β cells in the pancreas. Heredity plays a major role in determining susceptibility to β cell destruction. The most common presenting symptoms include hyperglycemia, polydipsia, polyuria, and metabolic acidosis. If uncontrolled, chronic high glucose levels lead to end organ damage to the vascular and microvascular system, peripheral neuropathy, kidney damage, and hypertension.[36,37]

Multiple Sclerosis

Multiple sclerosis is a neurologic disease that ranges from being relatively benign to overwhelmingly disabling as the immune system attacks the nerve-insulating myelin sheaths and disrupts communication between nerves and muscles. The first symptoms generally occur between the ages of 20 and 40 years and include a combination of blurred vision, blindness in one eye, muscle weakness, balance or coordination impairment, paresthesia, numbness or tingling, speech impediments, dizziness, or hearing loss. Over time, many people experience cognitive impairment, difficulty with concentration or memory, poor judgment, and depression. Although there is no cure, some medications are demonstrating promise in reducing the number of exacerbations and slowing the progression of physical disability.[38]

CASE STUDY



From Fuse/Thinkstock.

Case Presentation

Jonathan Eckert is a 22-year-old male who has been involved in a number of high-risk sexual behaviors. Three months ago, he developed a 4-day course of fever and chills, malaise, lethargy, night sweats, diarrhea, and anorexia. He believed he had acquired the flu (influenza) and self-medicated with acetaminophen, vitamin C, and increased fluid intake. He became increasingly concerned about his health because he had friends who were infected with HIV, so he contacted his primary care provider to obtain a blood screening test for HIV and hepatitis B and C.

Jonathan's screening test for hepatitis B and C was negative, and the HIV screening tests—ELISA and confirmatory Western blot—both returned positive for HIV infection. Additional laboratory testing was done to assess his red blood cell count, white blood cell count with differential, and CD4 and CD8 lymphocyte counts (lymphocyte immunophenotyping). All of his blood tests were within the normal range. Serologic testing for hepatitis B and C was negative, skin testing for tuberculosis returned negative, and a chest x-ray was unremarkable.

Jonathan was given information on the need to maintain a healthy lifestyle with appropriate nutrition; physical activity; stress management; avoidance of cigarettes and other forms of tobacco; maintenance of appropriate vaccinations, including an annual influenza vaccination; and adherence to safer sexual practices to avoid reinfection with a potentially more virulent strain of the virus and transmission of the virus to others. He was given information on community support groups and a referral to a care provider specializing in HIV/AIDS care. Research on the advantages of early treatment after HIV exposure and seroconversion were discussed with him. Although he demonstrated an understanding of the information, ongoing health education is recommended.

Case Analysis Questions

1. How would you describe Johnathan's current infection status?
2. Consider the immune response. How has Johnathan's immune system responded to the pathogen invasion?

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CONCEPT 22

Inflammation

Laura M. Klenke-Borgmann

Inflammation is a normal and expected physiologic response to cellular injury. The response is protective in that it provides an opportunity for the body to heal and repair the injury. This biophysical concept is foundational to patient care across the lifespan.

DEFINITION

The term *inflammation* is derived from the Latin *inflammare*—to set on fire. As a concept, Inflammation is defined as *an immunologic defense against tissue injury, infection, or allergy.* The Centers for Disease Control and Prevention (CDC) has defined inflammation as "the body's reaction to injury, irritation, or infection characterized by redness, swelling, warmth, and/or pain; caused by accumulation of immune cells and substances around the injury or infection."[1] Inflammation is a protective process initiated to minimize or remove the effect of the pathologic agent or stimulus triggering the inflammation, and to promote healing. Although inflammation is always present with infection, inflammation may also occur in the absence of infection. Inflammation is the body's physiologic response to injury—not the agent causing the injury as is seen with infection. The inflammatory process is very similar regardless of the cause of cellular injury; however, the degree of response varies depending on the severity and scope of injury and the physiologic capacity of the affected individual.[2–4]

SCOPE

The scope of inflammation ranges from no inflammation to active inflammation. Active inflammation is classified as acute, chronic, or reparative/restorative (Fig. 22.1). The scope also reflects that inflammation can be localized or systemic.

Injuries that cause an inflammatory response may be from various sources, including mechanical trauma (e.g., laceration, splinter, and crushing); thermal, electrical, or chemical trauma; radiation damage; or biologic assault (viral, bacterial, or fungal infections). Acute inflammation is the immediate response to tissue injury and is short in duration (minutes to days). The role of an acute inflammatory response is to eradicate the harmful stimuli from the body and to initiate repair. Inflammation that continues for extended durations (weeks to years) after the initial injury is termed chronic; because tissue is repeatedly being destroyed and repaired, healing is impaired. Localized chronic inflammation results in the formation of a granuloma—an accumulation of macrophages, fibroblasts, and collagen—as seen with untreated *Mycobacterium tuberculosis*. Systemic chronic inflammation may result from many diseases or may be the consequence of disease processes, including autoimmune diseases such as the inflammatory bowel diseases ulcerative colitis (UC) and Crohn disease. Chronic inflammation may be a complication of the inflammatory process, or it may be a consequence of disease, as seen in rheumatoid arthritis.[1–5]

NORMAL PHYSIOLOGIC PROCESS

The functioning of the immune system and the primary activities of an immune response, both acute and chronic, were presented in Concept 21, Immunity. An inflammatory response is often directly linked to the activities of the immune system, demonstrating the overlap and interplay of immune and inflammatory physiologic processes in providing protection to the host. Also, it has been noted that an inflammatory process has two primary functions directed at a positive outcome for the individual: (1) restitution of normal functioning cells after injury, or (2) fibrous repair when functional cells cannot be restored.

Inflammation is a process that involves white blood cells (WBCs) and several different chemicals that serve to protect the body against invading pathogens or cellular/tissue trauma. WBCs are attracted to an area of inflammation by chemotaxis. Chemotaxis is a complex process that involves more than a dozen different chemicals; the release of these chemicals is initiated by stimuli that may generally be classified into four categories: (1) bacterial or viral exotoxins, (2) degenerative by-products of inflammation, (3) products of complement system activation, and (4) reactive products of plasma clotting in the inflamed area.

Proinflammatory hormones are mediating factors in the inflammatory response and are critical to effective implementation of the response. There are three major hormone groups:

prostaglandins, cytokines, and histamines. In general, the proinflammatory hormones increase blood flow to the injured area, increase vascular membrane permeability, activate various components of an immune response (including the complement system of proteins), attract leukocytes to the area of injury, promote angiogenesis, stimulate growth of connective tissue, and cause fever.[3] Specific actions of selected proinflammatory, mediating hormones are listed in Table 22.1.

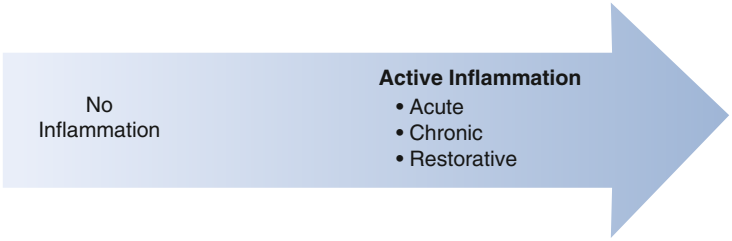

Fig. 22.1 Scope of Concept: Inflammation.

TABLE 22.1 Effects of Proinflammatory Mediators

Proinflammatory Factor	Source	Effect on Inflammatory Response
Prostaglandins	Phospholipids from mast cell and other cell membranes; derived from arachidonic acid in cell membrane	Mediate late stages of acute inflammatory response
Leukotrienes		Increase vasodilation
		Increase vascular permeability
		Active in anaphylactic hypersensitivity reactions
Bradykinins	Plasma protein	Increase vascular permeability
	Kinins	Increase vasodilation
		Responsible for pain production
Complement proteins	Macrophages	Primarily from proteins C3a, C4a, and C5a: initiate chemotaxis of neutrophils and macrophages
	Liver endothelium	Activate mast cells and basophils to release histamine, heparin, and other chemicals
		Result in increased blood flow, increased vascular permeability, and leaking of plasma proteins to extracellular fluid
Histamine	Mast cells	Mediates early acute inflammatory response
Serotonin	Basophils	Increases vasodilation
		Increases vascular permeability
IL1	Macrophages	Promotes T lymphocyte proliferation and differentiation
	Neutrophils	Promotes release of acute-phase inflammatory proteins
	B lymphocytes	Promotes neutrophil adhesion to endothelial cell walls
	Dendritic cells	Promotes development of fever
	Other antigen-presenting cells	
IL8	T lymphocytes	Chemotactic factor for neutrophils
	Monocytes (blood)	Chemotactic factor for T lymphocytes
	Macrophages (tissue)	
IL17	Helper T lymphocytes (T_H17 cells)	Increases chemotaxis of neutrophils
		Increases chemotaxis of macrophages
		Increases epithelial cell chemokine production
Platelet-activating factor	Platelets	Promotes secretion of chemical mediators
		Promotes vasodilation and increased permeability
		Activates neutrophils
Transforming growth factor-β	T lymphocytes	Inhibits T and B lymphocyte activity
	Activated macrophages	Chemotactic factor for macrophages
	Fibroblasts	Increases macrophage IL1 production
		Inhibits macrophages
TNF-α	Activated macrocytes	Promotes cellular proliferation
	Selected lymphocytes	Increases phagocytosis
		Increases leukocytosis
		Induces fever
		Promotes neutrophil adhesion to endothelial cell walls
		Toxic to some tumor cells

IL, interleukin; *TNF*, tumor necrosis factor.

Adapted from O'Toole, M.T. (Ed.), (2021). *Mosby: Mosby's dictionary of medicine, nursing, and health professions* (11th ed.). St Louis: Mosby; Hall, J. E. & Hall M.E. (2021). *Guyton and Hall textbook of medical physiology* (14th ed.). Philadelphia: Elsevier. (2016).; and McCance, K. L., Huether, S. E., Brashers, V. L., & Rote, N. S. (Eds.). (2019). *Pathophysiology: The biologic basis for disease in adults and children* (8th ed.). St Louis: Mosby.

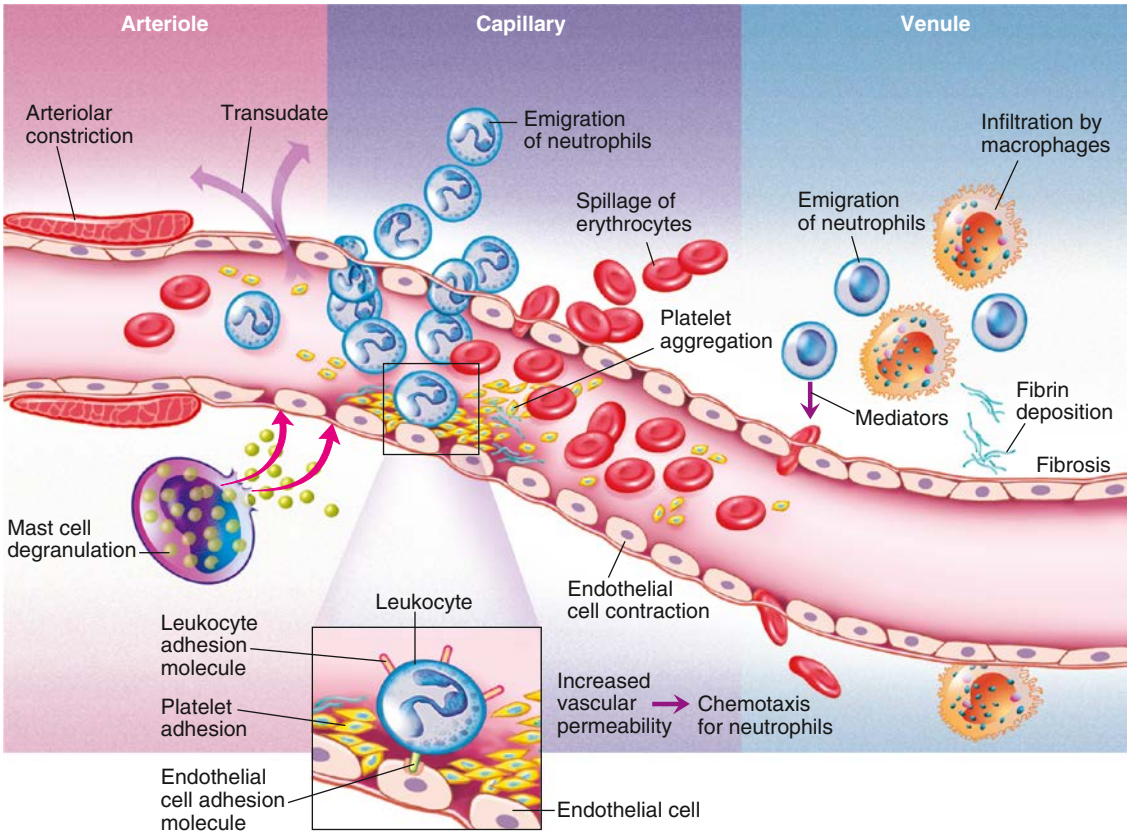

Fig. 22.2 Acute Inflammation Response. (From McCance, K. L., Huether, S. E., Brashers, V. L., & Rote, N. S. (Eds.). (2019). *Pathophysiology: The biologic basis for disease in adults and children* (8th ed.). St Louis: Mosby.)

Acute Inflammation

The pathologic processes associated with acute inflammation are complex but sequential, as shown in Fig. 22.2. They involve constant interactions among components of the immune system and are regulated by feedback systems. The primary steps in an acute inflammatory response have the following sequence:

1. Injury to, or death of, tissue and the release of chemical mediators
2. Vasodilation and increased blood flow to the small vessels surrounding the area of injury
3. Swelling and partial retraction or separation of activated endothelial cells
4. Increased vascular permeability and leakage of water, salts, fibrinogen (later becoming fibrin), and other small plasma proteins into the surrounding tissue
5. "Walling off" of the area from surrounding tissues to delay the spread of the pathogen and toxic products from the pathogen
6. Margination and migration of polymorphonucleocytes, monocytes, lymphocytes, and macrophages to the endothelial cell walls and out of the vascular system to the area of injury; margination of endothelial cell walls by neutrophils is possible because of the increased level of cellular adhesiveness created by activation of the endothelial cell.
7. Exudates exiting the vascular system fill spaces left by damaged, necrotic tissue
8. Movement of glucose and oxygen to the area in support of removal of necrotic tissue and cellular repair
9. Release of nitric oxide and prostacyclin, endothelin, thromboxane A_2, angiotensin II, growth factor, and chemokines from activated endothelial cells

Neutrophils are important in an acute inflammatory response. The movement of neutrophils is mediated by several chemotactic factors that arise from the area of tissue damage. The chemotactic factors bind to the surface of the neutrophils and cause them to release additional factors, resulting in pathogen breakdown from lysosomal cytoplasmic enzymes. The neutrophils are also directly involved in phagocytosis after they bind to antibodies already connected to the antigen. In preparation for the neutrophils, opsonization has occurred with either the antibody or the complement proteins; then neutrophil lysosomal granules can be released to begin phagocytosis. Note that during the process of phagocytosis, reactive oxygen species (ROS) are created by the neutrophils and macrophages. ROS bind with the lysosomes to help kill the invading pathogen.[6–8]

Neutrophil blood counts increase four- to fivefold within a few hours of the onset of acute severe inflammation, making more neutrophils available to continue the inflammatory response. Neutrophils are the primary WBC component of exudate created during an acute inflammatory response to bacterial invasion. Band cells, or immature neutrophils, may also be present in the blood to achieve the increased numbers of

neutrophils required of the severe response. The bone marrow will also significantly increase production of both granulocytes and monocytes; however, it takes 3 or 4 days before these cells are mature and ready to leave the bone marrow.[2]

Lymphocytes are most prominent in inflammatory responses to viral antigens. In combination with monocytes and macrophages, they are also important in chronic inflammation. Eosinophils are most evident in inflammatory responses to parasitic infections and allergic hypersensitivity immune reactions. Mast cells and basophils release histamine, which contributes to the increased vascular permeability seen in an inflammatory response.[2,9]

An acute inflammatory response may last minutes to days, with most of the activity taking place in the first 12 to 24 hours after tissue injury. The response may be localized or systemic. Localized inflammatory responses begin when damaged tissue or invading organisms activate the immune system. Complement system proteins and cytokines begin a cascading sequence of events that lead to the classic signs and symptoms associated with the immune response. Autoimmune reactions may cause systemic activation of the inflammatory response as the body is attacked by its own cells. In most people, the inflammatory response may last up to 5 days, during which invading pathogens are destroyed, antigens and necrotic tissue are phagocytized, and fibroblasts begin the process of tissue healing.

Chronic Inflammation

Macrophages are critical in a chronic inflammatory response. They release tissue thromboplastin to facilitate hemostasis and to promote fibroblast activity. They are instrumental in removing necrotic tissue and foreign pathogen material from the area of injury (debridement), allowing for repair and healing. Most WBCs in the exudate of a chronic inflammatory response are macrophages and lymphocytes. Unfortunately, when inflammation is chronic, healing processes may be interrupted by reinjury or renewed inflammation and immune system activity, with the inflammatory cycle being reactivated.

Chronic inflammation may also be subclinical, manifesting with elevated levels of nonspecific blood markers such as C-reactive protein (CRP) or an increased erythrocyte sedimentation rate (ESR), with no overt symptoms. A WBC scan, or inflammatory scan, may be required to identify areas of inflammation. Low-grade chronic inflammation has been associated with systemic manifestations such as body aches and pains, frequent infections, diarrhea, dry eyes, and shortness of breath.[9–11]

Regardless of whether the inflammation is acute or chronic, several systemic manifestations result. Localized symptoms depend on the degree of injury and the resistance of the host to injury. Systemic responses include neutrophilia, fever, malaise, loss of appetite, and muscle catabolism. The liver will respond by releasing several proteins, called acute phase proteins, that include complement system proteins, clotting factors, and protease inhibitors. The acute phase proteins also stimulate an increase in the level of fibrinogen, promoting hemostasis. CRP and serum amyloid are also released by the liver. CRP assists in opsonization of the foreign pathogen to facilitate phagocytosis.[2,3,7]

Age-Related Differences

There are several age-related differences in inflammatory response (see also Concept 21, Immunity). Neonates typically have reduced inflammatory responses to bacteria or viruses. This is because they have fewer granulocytes, particularly neutrophils, and monocytes, with an associated decreased chemotactic ability of those cells. Neonates also have substantially depressed complement responses because they have insufficient complement components, predominantly those of the alternate pathway. Like that of the immune response, this deficiency is transient; the inflammatory response matures as the individual matures from neonate to adulthood.[2,3]

The older adult is increasingly more susceptible to impaired inflammation and wound healing. Older adults also tend to have diminished inflammatory responses because of chronic illnesses, including cardiovascular disease and diabetes mellitus. The aging skin barrier, with diminished collagen and subcutaneous fat, leads to a loss of protection, whereas age-related atrophy of capillary beds can lead to tissue hypoxia and delayed wound healing.[2,3]

VARIATIONS AND CONTEXT

Variations in inflammation may occur in individuals across the life span, with a range of effects from minor symptoms, such as mild redness of the skin, to life-threatening consequences. Variations may occur because of acute or chronic inflammation or an autoimmune response. An acute inflammatory response after tissue insult or injury may evolve into a chronic condition, as demonstrated by the development of chronic sinusitis or cirrhosis after an acute inflammatory response to an antigen with continued tissue damage. An acute response may lead to tissue injury beyond that of the initial insult. For example, if inadequately treated, a mildly sprained ankle with tendon or ligament damage may lead to additional tissue injury and cellular death if postinjury swelling is not controlled. Chronic cirrhosis may also be the result of an acute infection with hepatitis C virus. Autoimmune diseases may also manifest with chronic inflammation, as is seen in rheumatoid arthritis.

CONSEQUENCES

Although inflammation has significant physiologic benefits, negative consequences are also possible and may include an overly severe immune response to stimuli, resulting in additional tissue damage, or an inadequate response, leading to infection or chronic inflammation and illness.[2] Spinal cord injuries are an example of one type of trauma in which the inflammatory response may cause significant additional tissue damage if swelling to the damaged region is not controlled. The physiologic response to injury that an inflammatory response provides—in this case, with increased blood flow, increased vascular permeability, and the movement of exudate to the damaged tissue—may cause additional compression-based trauma to an already damaged spinal cord.

Excessive stimulation of the inflammatory response and the development of chronic inflammation may also occur as

a consequence of hypersensitivity reactions, including allergies, by the immune system. In autoimmune diseases such as asthma, rheumatoid arthritis, multiple sclerosis, and systemic lupus erythematosus, the initial immune response and resultant inflammatory response trigger a sequence of cyclic physiologic responses that result in a pathologic disease process.

Systemic pathology may also result from an inflammatory response. Systemic inflammatory response syndrome may emerge as a consequence of a variety of underlying pathologic conditions. A similar pathology presents with minor differences, depending on the initiating etiology. The syndrome follows a three-stage process: Stage I presents with increased cytokine production, cellular inflammatory response, localized vasodilation, swelling, pain, increased heat production, loss of function, and leukocyte migration to the site. Stage II involves growth factor stimulation and increased macrophages and platelets to the region with the need for proinflammatory mediators to control the response. Stage III produces a systemic reaction and end organ dysfunction if homeostasis has not been restored.[11] Multisystem organ failure associated with sepsis or septic shock invokes both a strong immune response and a strong inflammatory response. One of the negative consequences of inflammatory activity in the presence of shock is that inflammatory mediators instigate the activation of coagulation inhibitors of fibrinolysis and may cause diffuse endovascular injury, organ dysfunction, or death. Widespread inflammation may also lead to hypovolemia, pleural effusion, respiratory distress, renal failure, and death.[12–14]

Chronic inflammation has been linked to several systemic diseases (or diseases with systemic consequences, if the affected individual is compromised). For example, recent attention has been paid to multisystem inflammatory syndrome in children and adults. It is a rare but serious inflammatory condition associated with COVID-19 that affects several body systems including the heart, lungs, and kidneys. Dubin and colleagues presented results of the Chronic Renal Insufficiency Cohort Study that demonstrated relationships among chronic renal disease and inflammation, cardiovascular diseases, and identification of high-risk subgroups. These findings point to the need to mediate the inflammatory process to prevent consequential tissue damage.[15] Chronic inflammation is also correlated with chronic diseases, such as Crohn disease, ulcerative colitis, anemia, neurologic disorders, and renal dysfunction. Similarly, interrelationships among autoimmune diseases such as asthma and diabetes, cancer, and inflammation are no longer considered theoretical.[2,15–17]

RISK FACTORS

Populations at Risk

Individuals of all ages, sexes, ethnic and socioeconomic groups, geographic locations, and prior health histories are susceptible to an acute or chronic inflammatory process. Age plays a role in the development of more severe inflammatory responses. For the very young, an immature immune system may lead to a more severe inflammatory response because the immune system is unable to control a minor pathogen, and infection may be severe. For older adults, the immune system becomes less able to respond to foreign pathogens, resulting in a stronger inflammatory response than might have been encountered earlier in life. Those who are uninsured or underinsured are at increased risk because they may not have access to sufficient or early healthcare intervention, and a comparatively simple inflammatory response to injury may escalate, becoming a more severe injury or chronic inflammation.[2,3,7,9]

Individual Risk Factors

Individual risk factors for an inflammatory response include the presence of autoimmune diseases and allergies, exposure to pathogens with or without resultant infection, and being very young or old with a compromised immune system. Genetics plays a role in the emergence of chronic inflammatory processes because many autoimmune diseases have a genetic basis for predisposition and involve an inflammatory response. Certain chronic disease processes, such as atherosclerosis, rheumatoid arthritis, diabetes mellitus, and cancer, may lead to or be the result of chronic inflammation. The role of obesity and vitamin D and magnesium deficiencies in the development of chronic inflammation continues to be researched.[18]

Any process that weakens the immune system increases the potential for what might have been a mild inflammatory response to develop into an acute severe inflammation or chronic inflammatory process.[2,3,7] The absence of effective hand hygiene procedures, the sharing of personal hygiene or grooming material and equipment, poor sanitation, poor nutrition, and living or congregating in tight spaces with large numbers of people increase the risk for infection and accompanying inflammation. Within the healthcare system, inadequate use of standard precautions increases the individual's risk for infection, with a resulting inflammatory response. Environmental factors, such as pollution and smoking, or exposure to repeated trauma, also increase the risk of stimulating an inflammatory response.

ASSESSMENT

As with other pathologic processes, the basis and extent of disease must be assessed to guide appropriate treatment interventions to either eradicate or manage inflammation, whether acute or chronic. Assessment of an individual for the presence of inflammation includes asking appropriate questions to elicit a history and conducting a physical examination. In addition, laboratory and diagnostic testing aids in the diagnosis. Common clinical findings associated with inflammation are featured in Table 22.2.

History

The history should be focused on determining the nature of the inflammatory trigger (e.g., recent injury and exposure to allergens and infectious agents), the patient's physiologic ability to respond, and the risk of ineffective inflammatory response. The nurse should also inquire about the presence of symptoms commonly associated with inflammation, including swelling, pain, and fatigue. It is also important to determine the duration of the inflammatory process and what treatment measures, if any, that have already been initiated.

TABLE 22.2 Clinical Manifestations of Inflammation

Local Manifestations	Systemic Manifestations

• Swelling
• Pain
• Heat
• Redness
• Exudate
  • Serous exudate
  • Fibrinous exudate
  • Purulent exudate
  • Hemorrhagic exudate
	• Fever
	• Leukocytosis
	• Increase in plasma proteins
	• Malaise
	• Fatigue

Examination Findings

Several classic findings are associated with inflammation. Obvious trauma or minor wounds will likely appear red, be warm to the touch, and be associated with some degree of pain. Swelling may be present with or without an open wound, such as would be seen with a strained or sprained joint. Exudate may be evident from a laceration or other injury in which the skin or mucosal surface has been broken. Any time an infection is evident, some degree of inflammation will also be present. Inflammation associated with an immune response, but without external trauma, will present with some combination of swelling, pain, fever, and decreased or absent functioning of the tissue or organ. Severe inflammation may be associated with shock syndrome or multiorgan failure, significant hyperthermia, seizure, coma, or death.

Diagnostic Tests

Laboratory testing and diagnostic data collection will be determined by the clinical presentation of the individual, the evidence of obvious trauma, the likelihood of exposure to infection-causing pathogens, and the patient's health history, particularly that related to immune dysfunction, immune deficiency, or a history of chronic illnesses.

Blood Tests

Blood testing for WBC count with differential is helpful in determining whether neutrophil, lymphocyte, or macrophage cell counts are elevated, which would indicate bacterial or viral infection and acute or chronic inflammation. CRP and ESR blood testing are nonspecific blood tests that will confirm the presence of inflammation but do not indicate the location or cause. Various serologic tests for viruses or antibodies against pathogens such as hepatitis, HIV, Epstein–Barr virus, severe acute respiratory syndrome, herpes simplex, syphilis, methicillin-resistant *Staphylococcus aureus, Clostridium difficile,* and *Helicobacter pylori* will be helpful in determining the cause of inflammation and will guide treatment regimens to eradicate or control infection and minimize damage from inflammation.[7]

Radiographic and Other Testing

Computerized (or computed) tomography (CT) scan, magnetic resonance imaging, proton emission tomography scans, or colonoscopy are useful in determining the location and extent of inflammation within the body.

CORE COMPETENCIES

Inflammation

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to inflammation.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to inflammation.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to inflammation.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to inflammation.
- Demonstrate clinical judgment founded on broad knowledge of inflammation.

CLINICAL MANAGEMENT

Primary Prevention

Preventing inflammation is directed at reducing risk for injury and infection. Although many injuries occur because of accidents, with an associated inflammatory response being unavoidable, some precautions can be taken. Following appropriate hand hygiene precautions can significantly decrease the risk of pathogen transmission between people, thus reducing the potential for an inflammatory response. Using designated safety equipment when involved in sports or other physical activity can also minimize the incidence of injury. In addition, being aware of food and water safety standards and any issues that may arise from contamination can prevent the transmission of pathogens and avoid potential inflammation associated with an immune response.

Secondary Prevention (Screening)

There are no routine screening procedures for inflammation, making primary prevention strategies critical in reducing the incidence and severity of inflammatory responses.

Collaborative Interventions

The clinical management of inflammation is directed at mediating the inflammatory process to promote repair and healing and to avoid an excessive inflammatory response that may lead to further tissue injury. Some general guidelines to treatment can be made depending on the cause of the inflammation. If inflammation is the result of infection, the underlying cause of the infection must be eradicated. If inflammation is the result of a hypersensitivity-type immune response (e.g., allergies, asthma, or autoimmune diseases), the management of inflammation must be combined with management of the immune response and the pathologic consequence of immune dysfunction (e.g., diabetes, inflammatory bowel syndrome, rheumatoid arthritis, or muscular sclerosis). If inflammation is the result of an uncomplicated strain or sprain, a standard treatment regimen of rest, ice, compression, and elevation (RICE) combined with nonsteroidal antiinflammatory drugs (NSAIDs) will help with pain management and moderating the inflammatory response.

Chronic inflammatory responses to disease require careful monitoring to prevent or slow the process of tissue damage that may result in organ failure. Treatment of the underlying cause of the disease, support for ongoing tissue function, and prevention of organ or limb dysfunction or deformity are all important areas of clinical management. Sometimes treatment is aimed at finding alternative routes to achieve physiologic outcomes (e.g., providing insulin to the individual with type 1 diabetes), replacing endogenous insulin that is no longer being manufactured in the pancreas.

Rest, Ice, Compression, and Elevation

Rest, ice, compression, and elevation (referred to as *RICE*) represents a set of activities directed at minimizing the swelling associated with a sprain or strain. Swelling of the tissues immediately surrounding an area of injury is a part of the normal inflammatory response. By minimizing swelling, the injured tissue and surrounding tissue will be protected from additional damage resulting from the swelling itself. The first 24 to 48 hours after the injury is the critical period during which RICE measures will be most beneficial. Typically, icing the sprain or strain for 10 minutes every 2 or 3 hours is indicated; leaving the ice in place for a longer period may cause additional tissue damage. Compression of the damaged area also helps to minimize swelling; the compression wrap must be snug but not so tight as to impede circulation (be alert to fingers or toes becoming cool, tingling, or turning blue in color). Whenever possible, elevation of the injured area above the level of the heart is useful to help minimize swelling.

Immobilization Devices

Immobilization devices, such as splints or slings, contribute to the ability to rest the injured area. Wheelchairs, walkers, or crutches also may be useful in minimizing weight bearing of an injured extremity. If bed rest is indicated, leg exercises or pneumatic compression devices should be considered to protect against thrombus formation in the legs.

Pharmacologic Agents

Pharmacologic intervention options are diverse and depend on the cause of inflammation. Three major goals of treatment include reducing inflammation, managing fever, and providing pain relief. For this reason, many pharmacologic agents prescribed for the treatment of inflammation have one or more of these properties.

Steroidal agents. Glucocorticoids (e.g., prednisone) are steroids used to suppress the immune system and, thus, suppress an inflammatory response. They are particularly effective in reducing the swelling and pain that accompany inflammation. Steroids such as prednisone are used in a wide range of inflammatory conditions—from swelling after trauma to inflammation found in allergies and autoimmune diseases such as rheumatoid arthritis or systemic lupus erythematosus.[19]

Nonsteroidal antiinflammatory drugs. NSAIDs, such as ibuprofen or naproxen, are important in the management of pain, fever, and inflammation. These medications may be found as over-the-counter products, or they may be combined with narcotics (e.g., hydrocodone or oxycodone) and require a prescription. Significant inflammation may require the use of cyclooxygenase (COX) inhibitors. COX1 is produced by all tissues and promotes several protective functions. COX2 is produced primarily at sites of tissue injury and acts to mediate inflammation and to sensitize receptors to painful stimuli. It is also found in the brain, where it helps to mediate fever and assist the brain in pain perception. Inhibition of COX2 leads to the suppression of inflammation, the control of pain, and the reduction of fever. However, it is important to note that with exception of celecoxib (Celebrex), COX2 inhibitors are not available in the United States since 2011 because of adverse effects. First-generation NSAIDs inhibited both COX1 and COX2, and newer-generation NSAIDs (e.g., celecoxib) can inhibit COX2 only.[19]

Recombinant DNA and monoclonal antibodies. Recombinant DNA and monoclonal antibody development have produced an entirely new line of pharmacologic treatment for inflammation. Interleukin 1 (IL1) antagonists inactivate IL1 receptors, whereas tumor necrosis factor α (TNF) inhibitors prevent IL1 from producing its inflammatory actions but leave the individual more susceptible to infections. Recombinant protein C helps the body dissolve microvascular clots formed during inflammation, and although infliximab (Remicade) is a TNF inhibitor, it has been key to more recent treatments of lymphoma, rheumatoid arthritis, and inflammatory bowel diseases.[19]

Antipyretics. Fever is a common physiologic response to an inflammation. For this reason, antipyretics are often administered for fever management. Antipyretic agents, such as acetaminophen, aspirin, and NSAIDs, reduce fever by inhibiting cyclooxygenase. These are often administered in combination with opioid analgesic agents.

Analgesics. Nonopioid analgesic agents, such as acetaminophen or aspirin, are the most common type of analgesic used for pain relief caused by inflammation. NSAIDs are also considered analgesics because a reduction in inflammation tends to also relieve associated pain. Opioid analgesic agents are used when inflammatory pain is severe.

Antimicrobials. Antibiotics, antivirals, and other antimicrobials are important in treating the underlying cause of infection leading to inflammation. Antimicrobials encompass a wide variety of medications that are required to treat diseases associated with immune and inflammatory responses. These are discussed further in Concept 23, Infection.

INTERRELATED CONCEPTS

Several concepts featured in this textbook are interrelated with inflammation (Fig. 22.3).

Immunity and **Infection** are likely the most closely related concepts. Many of the pathophysiologic processes associated with inflammation are also found in both immunity and infection, with pathology from one process overlapping those of the other two processes or with one process triggering another. This can be seen with hypersensitivity reactions of the immune

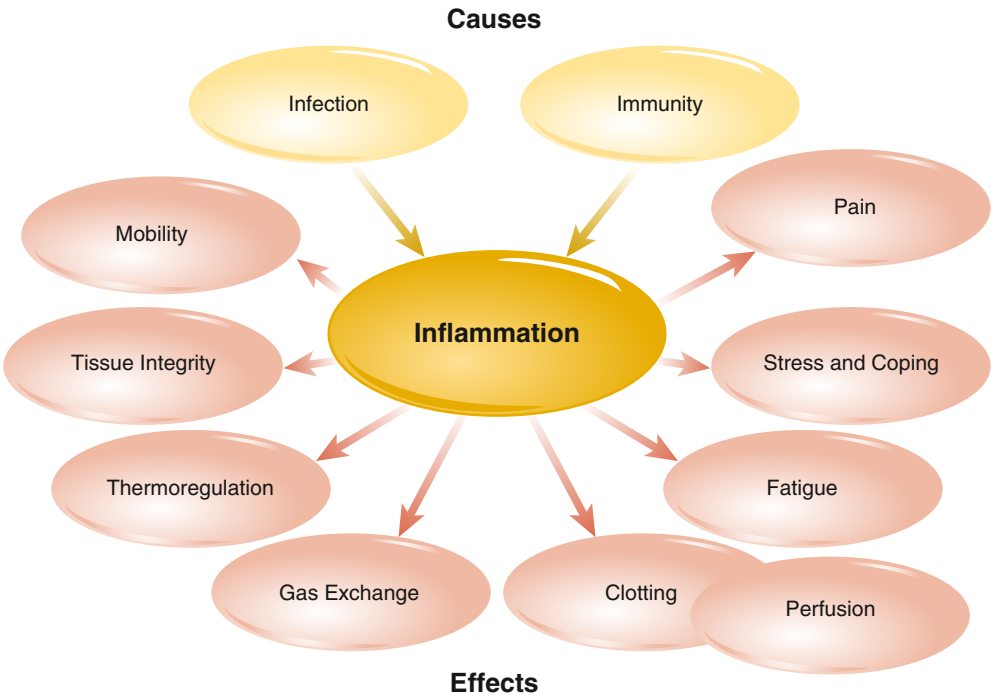

Fig. 22.3 Inflammation and Interrelated Concepts.

system triggering an inflammatory response, or infection stimulating an inflammatory response.

Tissue Integrity is at risk in an inflammatory response; impaired **Mobility** and **Pain** associated with an initial injury and with the consequences (swelling) of an inflammatory response are also possible. **Thermoregulation** may be influenced by inflammation depending on the severity of the response to tissue injury. **Gas Exchange** may be insufficient in the presence of inflammation-induced pleural effusion. Hemostasis alterations, in the form of microvascular **Clotting**, lead to impaired **Perfusion** as a consequence of inflammation, particularly if the condition is chronic.

Both **Fatigue** and **Stress and Coping** are often associated with injury and recovery from an acute inflammatory response or may be prolonged during the chronic inflammation from an autoimmune hypersensitivity reaction.

CLINICAL EXEMPLARS

Exemplars for the concept of inflammation are presented in Box 22.1. These are divided into conditions that represent acute inflammation, chronic inflammation, or inflammation based on the presence of an autoimmune hypersensitivity response. Note that overlap often occurs between acute and chronic inflammation, with chronic inflammatory conditions having acute exacerbations and acute inflammatory responses developing into chronic conditions. Thus, some artificial division among the three types of inflammation is unavoidable. It is beyond the scope of this concept to provide details for each of these exemplars, but some of the most common are briefly described. Additional information about these exemplars can be easily found in a variety of nursing textbooks.

Featured Exemplars

Bronchitis

Bronchitis is inflammation of the bronchial tubes and may begin as an acute irritation and progress to chronic infection. Bronchitis is commonly seen after the introduction of a cold virus or other respiratory infection. Acute bronchitis typically presents with symptoms such as cough, increased production of thick mucus that may be clear or discolored, shortness of breath, fever and chills, and chest tightness on inspiration. The cough associated with acute bronchitis may persist for days or weeks after resolution of the initial infection. Should chronic bronchitis develop over time, it would be considered a chronic obstructive pulmonary disease (COPD).[6,7]

Gastroenteritis

Gastroenteritis is inflammation of the stomach and intestines. It may be caused by a variety of viruses, contaminated water or food, or as a side effect of medications. In infants it may present with the introduction of allergens within new foods. Symptoms generally last for a few days and include nausea or vomiting, abdominal cramps and diarrhea, or a low-grade fever. The course of the inflammation is usually self-limiting, but it may require more aggressive treatment if symptoms persist for more than 2 days. Dehydration is a common manifestation and can be life-threatening if undetected and untreated.[20,21]

Atherosclerosis

Atherosclerosis is a disease characterized by the buildup of plaque on the intimal layer of arteries and represents a chronic inflammatory process. Plaque is made up of fat, cholesterol, calcium, and other substances that harden and narrow the lumen of arteries over time. Atherosclerosis can

BOX 22.1 EXEMPLARS OF INFLAMMATION

Acute Inflammation

- Acute infection (bacterial, viral, fungal, parasitic)
- Bronchitis
- Burn
- Bursitis
- Foreign body injury
- Insect bite or sting
- Joint sprain or strain
- Nephritis
- Rheumatic fever
- Tendonitis
- Traumatic injury

Chronic Inflammation

- Atherosclerosis
- Chronic infection
- Chronic obstructive pulmonary disease
- Cirrhosis
- Diverticulitis
- Fibromyalgia
- Gingivitis
- Inflammatory bowel disease
- Myocarditis
- Osteoarthritis
- Psoriasis
- Vasculitis

Autoimmune-Based Inflammation

- Asthma
- Crohn disease
- Goodpasture syndrome
- Graves disease
- Multiple sclerosis
- Myasthenia gravis
- Rheumatoid arthritis
- Systemic lupus erythematosus

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affect every artery in the body, including those in the heart, peripheral arteries, brain, and kidneys. Atherosclerosis of the coronary arteries leads to coronary artery disease and myocardial infarction, whereas atherosclerosis of the carotid arteries may lead to stroke. Chronic kidney disease and end-stage renal disease or kidney failure are consequences of atherosclerosis of the renal arteries.[7,22]

Cirrhosis

Cirrhosis is a disease state that results from the destruction of healthy liver tissue and replacement with scar tissue. Chronic cirrhosis may evolve from an acute injury or be the result of chronic liver tissue insult. The scar tissue may block blood flow through the liver or cause healthy functioning cells to transform into scarred cells and nonfunctional tissue, making the liver unable to sufficiently provide the metabolic support to maintain homeostasis. Cirrhosis results in disturbance of many systems because of the diminished ability of the liver to produce clotting factors, immune factors, and bile, and to remove the waste products of metabolism and medications.[7,23]

Asthma

Asthma represents an autoimmune-based inflammation. The National Asthma Education and Prevention Program Expert Panel defined asthma as "a common chronic disorder of the airways that is complex and characterized by variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and underlying inflammation. The interaction of these features determines the clinical manifestations and severity of asthma."[24] Airway inflammation leads to airway obstruction and the development of bronchoconstriction, airway hyperresponsiveness to stimuli, and airway edema with hypersecretion of mucus. Asthma may be caused by innate immunity, genetics, exposure to tobacco smoke, or environmental factors (e.g., airborne antigens or viral infections).[25]

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is an autoimmune disease that causes inflammation in the joints and is characterized by periods of flares and remission. Although the exact cause of RA is unclear, research has demonstrated links among genetics, the environment, and some hormones. There is no cure for RA, but it has been documented to flare and then go into complete remission with no long-term sequelae. Treatment involves managing pain, controlling joint swelling, and ensuring joint function is retained. Recent research is directed at immunotherapies to restore immune tolerance of the "self" and the critical immunopathogenic pathways seen in RA.[26]

CASE STUDY

From imtmphoto/iStock/Thinkstock.

Case Presentation

Chris Shomni is a 40-year-old male in a stressful, professional position. He was recently diagnosed with ulcerative colitis (UC) after developing abdominal pain and cramping and bloody diarrhea intermittently (although more frequently recently) during the past several weeks. He has lost 10 pounds in the past 4 weeks and has complained of nausea and fatigue. A colonoscopy demonstrated the presence of significant inflammation and ulcers in the colon and rectum. No strictures, perforations, or areas of paralysis of the colon were noted. Biopsy and further evaluation of the colonoscopy confirmed the presence of UC and ruled out Crohn disease. He has no family history of inflammatory bowel disease. Assessment of the skin revealed the presence of erythema nodosum lesions, which are characteristic of UC. Laboratory testing further identified the presence of lowered red blood cell (RBC) count and hemoglobin level, an elevated platelet count, and a normal white blood cell count. Serum total protein and albumin levels were low.

A diagnosis of UC was made, with complications of anemia and hypoalbuminemia. Mr. Shomni was also demonstrating impaired nutrition because of impaired nutrient absorption, and diarrhea and anemia secondary to inflammation of the bowel and loss of fluid, protein, and RBCs. Pain from inflammation and abdominal cramping was present but not significant, and he was at risk for fluid volume deficiency. It was determined that the bowel needed to be rested, that bowel resection surgery was not indicated at this time, and that inflammation must be reduced. Mr. Shomni was admitted to the hospital to begin treatment for inflammation, rest the bowel, reduce his diarrhea, and balance his fluid and electrolyte levels.

The overall goals of treatment for Mr. Shomni included controlling colon inflammation, ensuring adequate nutrition and hydration, and relieving pain and diarrhea. With control of inflammation and diarrhea, it is expected that the anemia and hypoalbuminemia will resolve. Pharmacologic intervention included aminosalicylates containing 5-aminosalicylic acid (5-ASA) to control inflammation. Corticosteroids to reduce inflammation will only be used if Mr. Shomni has an exacerbation of his UC and his disease becomes severe and nonresponsive to 5-ASA. If Mr. Shomni does not respond sufficiently to the 5-ASA or corticosteroids, then immunomodulators (e.g., 6-mercaptopurine) or monoclonal antibodies (e.g., infliximab) may have to be introduced in the future. With chronic inflammatory bowel disease, at some point in his life, Mr. Shomni may need to have surgery for a colostomy or ileostomy because tissue damage to the intestinal tract may be so severe that it no longer functions.

Mr. Shomni was discharged after 3 days with new medications and instructions to avoid enteric and time-released medications; an understanding of dietary changes to include specifically prescribed bacterial probiotic cultures; strategies for stress reduction; and actions to be taken should signs and symptoms of an inflamed or infected bowel be evident.

Case Analysis Questions

1. Consider Fig. 22.1. Where does this case fit on the scope of inflammation?
2. What are the primary treatment options represented in this case?

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CONCEPT 23

Infection

Staci S. Reynolds

Microorganisms are found throughout the environment. As a consequence, humans are constantly exposed to a multitude of microorganisms at every moment. Although many microorganisms do not pose a health threat to humans, some cause human disease and are known as pathogens. Our bodies are constantly confronted with pathogens in the forms of bacteria, viruses, parasites, or fungi. These pathogens are routinely found on the skin; the mucous membranes; the linings of the respiratory, gastrointestinal, and urinary tracts; and the mouth and eyes.[1] Typically, an individual's immune system is able to rid the body of pathogens without developing an infection. An infection occurs when a susceptible host is invaded by a pathogen that multiplies and causes disease. This concept presentation provides an overview of the infection concept, including identifying individuals most at risk, recognizing signs and symptoms of infection, and understanding ways to treat or manage an infection.

DEFINITION

For the purposes of this concept presentation, infection is defined as *the invasion and multiplication of microorganisms in body tissues, which may be clinically unapparent or result in local cellular injury due to competitive metabolism, toxins, intracellular replication, or antigen–antibody response*. Several additional terms are important to understand. When an infection occurs, it may be acute (resolving in a few days or weeks) or chronic (an infection that typically lasts longer than 12 weeks and, in some cases, is incurable). Terms are also used to describe the extent of spread in the body. A localized infection is limited to a specific body area. *Disseminated* is a term used to describe a spread of infection from an initial site to other areas of the body. The term *systemic* is used to describe an infection that affects the body as a whole or has spread throughout the body. Sepsis, a common type of systemic infection, is the presence of pathogens in the blood or other tissues throughout the body.

Two additional terms that are significant to the concept of Infection are epidemic and pandemic. The term *epidemic* is used to describe a situation in which there are more cases of an infectious disease than is normal for the population or geographic area. A *pandemic* is a worldwide epidemic of a disease, such as that of the COVID-19 pandemic.[2] The global nature of our modern world presents challenges because people with asymptomatic infections can travel from home to nearly anywhere in the world in less than 24 hours. Professional conferences, worldwide sporting events, and gatherings for various types of entertainment can bring large numbers of people together from all over the world. People with asymptomatic infections often travel to and from the events in confined airplanes and participate in events in close proximity to others. Exposure to infection can lead to the spread of disease before returning to their homes.

SCOPE

Infections may be categorized in several ways, including on the basis of the multiple variables involved such as mode of transmission, trajectory of illness, and body systems affected. The most common way to categorize and discuss infections is based on the classification of the causative microorganism (Fig. 23.1).

The most common microorganisms initiating an infection are bacteria, viruses, fungi, and parasites or protozoa. Table 23.1 identifies common pathogens for each of these microorganism categories. The type of invading organism influences the immune response. B lymphocytes and T lymphocytes take "leadership" roles depending on whether it is a bacterial or viral invasion. The complement system is always present to enhance

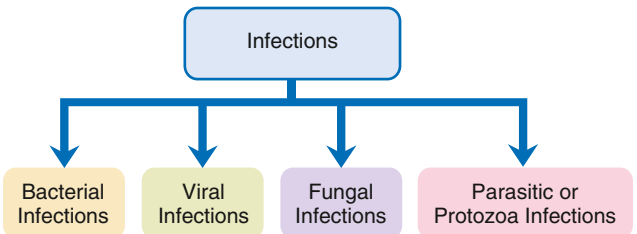

Fig. 23.1 Scope of Concept: Infection.

the immune response, and dendritic cells help modulate the immune response.[1,3]

Bacterial Infections

Bacteria are one-celled organisms without a true nucleus or cellular organelles. They synthesize deoxyribonucleic acid (DNA), ribonucleic acid (RNA), and proteins and can reproduce independently, but they require a host as a suitable environment for multiplication. Bacteria cause cellular injury by releasing toxins that are either exotoxins (enzymes released by gram-positive bacteria into the host) or endotoxins (part of the bacterial cell wall of gram-negative bacteria that can cause damage to the host even if the bacteria are dead). Diseases caused by bacterial invasion depend on the type of bacterial pathogen and the area of the body that is primarily invaded.[4,5]

Viral Infections

A virus is a pathogen with a nucleic acid within a protein shell, and viruses require a host for replication. An invading virus may immediately cause disease or may remain relatively dormant for years. The virus causes cellular injury by blocking the host cell's genetically prescribed protein synthesis processes and using the host cell's metabolic processes to reproduce. Diseases develop as a result. The virus interferes with the normal cellular functioning of the host, and destruction of the virus by the immune system also kills the host cell.[4,5]

Fungal Infections

A fungus is a microorganism belonging to the kingdom Fungi, which includes yeasts, molds, and mushrooms. They may grow as single cells (yeasts) or as multicellular filamentous colonies (molds or mushrooms). In an otherwise healthy individual, fungi do not cause disease and are contained by the body's natural flora. Fungi causing disease are termed *fungi imperfecti*, and in an immunocompromised individual, they can cause infections that lead to death.[4,5] Other fungal infections, such as tinea pedis (athlete's foot) or ringworm, may also develop in an individual with a competent immune system.

Protozoa/Parasitic Infections

Protozoa include a subcategory termed parasitic protozoa and, with few exceptions, generally infect individuals with compromised immune responses. They are typically found in dead material in water and soil and are spread by the fecal–oral route by ingesting food or water that is contaminated with the parasitic spores or cysts. Disease may develop in an otherwise healthy individual when the spores invade organs and stimulate an immune response, interfering with normal functioning of the organ system.[4,5]

Other Types of Infections

Sometimes an infection will begin as one type and after an additional pathogen is introduced, a secondary infection occurs. Fungal infections may develop when treatment for a bacterial infection decimates the body's natural flora, or bacterial infections may arise when a debilitated body is treated for a viral infection. When considering bacterial infections, some bacteria are always pathogenic and are never part of the normal flora, but may cause subclinical infection *(Mycobacterium tuberculosis);* some bacteria are part of the normal flora but can become pathogenic *(Escherichia coli);* some are part of the normal flora but can cause infection if they reach deep tissues, perhaps by surgery *(Staphylococcus epidermidis);* and some bacteria are part of the normal flora and become pathogenic when the individual is immunocompromised *(Acinetobacter).*[4,5]

An increase in morbidity and mortality secondary to infections has been seen from the emergence of previously unknown infections and the reemergence of infections that were considered controlled in various areas of the world.[4] As these infections manifest, globalization of travel and increased ease of introducing new infections into a geographic area have contributed to increases in morbidity and mortality.

Healthcare-associated and community-acquired infections have emerged as a significant public health concern. Methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridioides difficile (C. difficile),* carbapenem-resistant *Enterobacterales* (CRE), and vancomycin-resistant *Enterococci* (VRE) are debilitating healthcare-acquired diseases; community-acquired MRSA is even more prevalent in some areas.[6] Hospitals and other healthcare centers have been proactive in providing alcohol-based solutions for hand hygiene in both patient care rooms and public areas, but this same attention to infection prevention has not translated nearly as extensively to sporting arenas, areas where children gather for sporting and other group events, restaurants, grocery stores and other shopping facilities, movie theaters, and other group activity locales.[7–10]

TABLE 23.1 Common Pathogens

Bacteria	Virus	Fungus	Parasite or Protozoa
Methicillin-resistant *Staphylococcus aureus*	HIV	Tinea pedis	Giardiasis
Clostridium difficile	Hepatitis A, B, C, or E virus	Candidiasis	Trichinosis
Vancomycin-resistant *Enterococci*	Human papillomavirus	Histoplasmosis	Toxoplasmosis
Streptococcus pyogenes (group A)	Ebola virus	Lobomycosis	Malaria
Corynebacterium diphtheria	Hantavirus	Cryptococcosis	Ascariasis
Escherichia coli	SARS-associated coronavirus (such as COVID-19)	Aspergillosis	Pediculosis
Mycobacterium tuberculosis	Respiratory syncytial virus	Coccidioidomycosis	Cryptosporidiosis
Pseudomonas aeruginosa			*Pneumocystis jirovecii* pneumonia
Neisseria gonorrhoeae			
Clostridium tetani			

SARS, severe acute respiratory syndrome.

NORMAL PHYSIOLOGICAL PROCESS

Pathogens may be highly virulent and able to cause disease when small numbers invade the body. Other pathogens are weakly virulent and able to cause disease only when an excessive number invade the body, or the host body is already weakened by disease, malnutrition, excessive fatigue, or other stresses. Opportunistic infections cause disease when the host immune system is severely compromised, such as that seen in HIV infection leading to AIDS.

Some diseases are communicable before symptoms are evident in the carrier (herpes simplex virus, varicella–zoster virus, human papillomavirus, influenza, or poliomyelitis), whereas others remain communicable after initial symptoms have subsided (HIV and Epstein–Barr virus). Some infections remain dormant within the host and may resurface as the same or as a different disease; an example is the varicella–zoster virus (VZV), which first presents as chickenpox and later may manifest as shingles.[11] The "iceberg" concept of infectious disease has also emerged. This concept postulates that there are three levels of infection: (1) The vast majority of a population may, at any given time, carry an infection for which they are asymptomatic or undiagnosed. This group is thought to be the largest section of individuals—the part of the iceberg that is underwater. (2) A smaller population group presents with an infection that manifests as a less severe, symptomatic disease. (3) The smallest group presents with classical, clinical symptoms of disease and is the very tip of the iceberg. Epidemiology is important in the study of infection because it is concerned with the manner in which a disease spreads through groups or a population and with the application of this information to the control of health problems.[5]

Infection Process

An infection involves an interface with a host, the environment, and a pathogen (Fig. 23.2). The process of infection requires the following six elements, all of which must be present for the infection to develop: pathogen, susceptible host, reservoir, portal of exit (from the reservoir), mode of transmission, and portal of entry (to the susceptible host). The reservoir is anywhere the pathogen may live and multiply, either in the body or on objects within the environment contaminated with the organism (e.g., door handles, stagnant water, and healthcare equipment). Portals of exit for a pathogen include urine or feces, saliva, blood, skin, or the gastrointestinal tract. Portals of entry include broken skin, intimate sexual contact, mouth, respiratory tract, gastrointestinal tract, and contaminated food or water. The spread of infection is dependent on a reliable mode of transmission.

Pathogen Invasion

When a pathogen invades the body, a number of immune system responses are initiated to minimize tissue and organ damage. B lymphocytes are activated to differentiate into plasma cells for the production of antibodies and memory cells in preparation for a future reexposure. T lymphocytes directly kill the invading organism, secreting lymphokines that attract and stimulate the activity of macrophages. Macrophages and monocytes

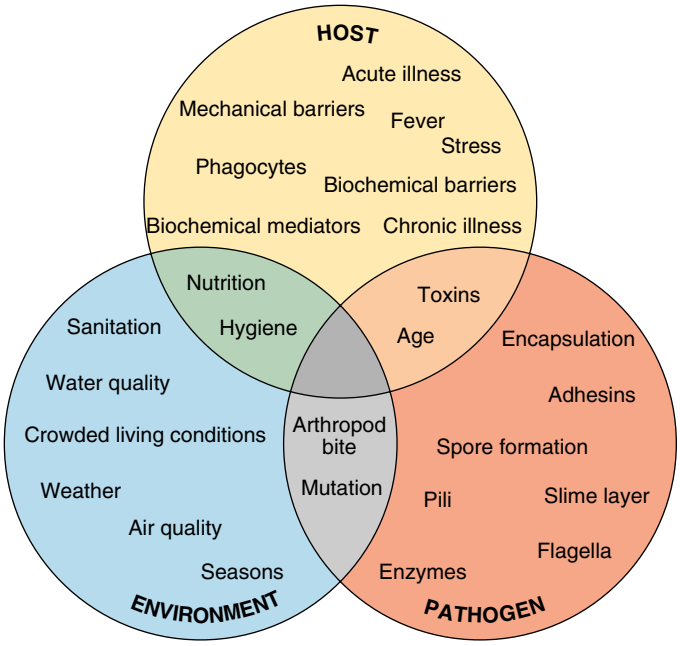

Fig. 23.2 Process of Infection: Interactions of Host, Pathogens, and the Environment. (Modified from Copstead, L.C., & Banasik, J.L. (2013). *Pathophysiology* (5th ed.). St Louis: Saunders.)

initiate phagocytosis. The complement system is activated to enhance the entire immune response. Some tissue damage will occur as a result of endotoxins released by the pathogen that kill host cells, neurotoxins that affect nerve impulse transmission, or enterotoxins that damage cells of the gastrointestinal tract. The physiological effect of endotoxins may be mild (fever, chills, weakness, and malaise) or severe (shock syndrome or disseminated intravascular coagulation). Some injuries leading to infection will also manifest with swelling and tenderness at the site, drainage from a wound, or red streaks on the skin leading away from the injury. These manifestations are associated with an inflammatory response.[1]

Infections remain a significant cause of morbidity and mortality because of the emergence of antibiotic-resistant bacteria, the development of infections that have become resistant to multiple antibiotics, and the occurrence of both infections that had previously been controlled and newly discovered infections. Some bacteria are able to adapt, with the ability to produce toxins and extracellular enzymes that destroy phagocytic cells, coat part of an antibody to prevent its activation of the complement system, or degrade and suppress immune response.[4] Exotoxins released by bacteria may act locally at the site of infection or enter the blood and produce symptoms throughout the body. Symptoms associated with the release of exotoxins from various pathogens include profuse diarrhea (cholera), spastic paralysis (tetanus), phagocyte death (gangrene), and prevention of nerve impulse transmission (botulism). Severe exotoxin release may cause septic shock syndrome, which, if not controlled rapidly, can lead to death.

Age-Related Differences

Variations in the body's response to infection are evident in pregnant women, infants and young children, and older adults

as a result of either an immature immune system or a compromised immune system. Infants and young children may have a diminished response to an invading pathogen (i.e., bacteria or virus) resulting in increased susceptibility to infection. Older adults with diminished immune response may have muted inflammatory responses to infection. For example, an older adult may have limited purulent drainage or pus within an infected wound, or they could be afebrile in the presence of an infection (i.e., urinary tract infection). Older adults may instead present with symptoms such as dizziness, confusion, anorexia, or fatigue. The presence of comorbidities (diabetes, cancer, kidney disease), particularly in older adults, may also alter the body's response to infection.

VARIATIONS AND CONTEXT

Infections vary by severity, location, host response to treatment, and potential for debilitating consequences or sequela. Variations such as these can affect individuals of any age, gender, ethnicity, socioeconomic status, geographic location, or prior health history. Infections may occur singularly or in combination, such as bacterial infections superimposed on an existing viral infection (e.g., *Streptococcus pneumoniae* after infection with a cold virus), a new viral infection secondary to an existing viral infection (e.g., cytomegalovirus and HIV), or a fungal infection developed during treatment for a bacterial infection (e.g., development of *Candida albicans* after antibiotic treatment). Infections also may be mild and self-limiting, as is often observed when an infection develops in a simple cut or abrasion requiring first-aid treatment, or the infection may be life-threatening, as is the case with systemic septicemia requiring hospitalization.

CONSEQUENCES

Infections that are severe, respond poorly to therapy, or are untreated may challenge the body's restorative and compensatory responses. This can potentially lead to the development of septic shock syndrome and multiorgan dysfunction syndrome (MODS), also known as multisystem organ failure (MSOF). Symptoms of MODS may include hypotension, tachycardia, tachypnea, oliguria or anuria, hypoxia, hypercapnia, seizures, or coma. The pathologic processes leading from uncontrolled infection or septicemia to multisystem failure and the symptoms just identified involve complex interactions among a number of body systems. A bacterial infection is described as the foundation for this potential progression.

Unresponsive or Untreated Infection

When a bacterial pathogen invades the body and initiates an immune response, lymphocytes (to produce antibodies), the complement system, and phagocytes will respond aggressively. After invasion, bacteria will cause cellular injury, with the release of exotoxins or endotoxins—or both—into the host, and initiate an inflammatory response. Exotoxins released during bacterial growth damage host cells, as do endotoxins released after bacterial cell death. In some cases, a combination of the relative virulence of the bacteria and the immunocompromised status of the host may allow for the bacterial infection to overwhelm the immune system and cause significant host damage before an effective defense can be mounted against the bacteria. When this happens, the host will initiate compensatory actions to support vital functions, but these actions will eventually fail without supportive treatments, leading to the death of the host.

Vascular, Renal, and Nervous System Compensation

An inflammatory response to the invading bacteria will initiate the host defense mechanisms. This response will trigger a complement system response and all of the activities inherent in that type of response. Vascular permeability will increase and allow for the shift of fluid from the intravascular compartment to the extravascular/extracellular spaces in the tissues, leading to hypovolemia and hypotension. The nervous system will attempt to compensate for the hypotension with peripheral vascular constriction and shunting of blood from nonessential to essential organs such as the brain, heart, and lungs. Acute systemic hypoperfusion may ensue and result in increased heart rate and cardiac contractility in an effort to maintain cardiac output. In this early period, inadequate tissue perfusion may cause organ damage despite a hyperdynamic cardiovascular state.

The renal system will initially attempt to compensate by creating a vasodilatory response of the glomeruli in an attempt to maintain an internal degree of pressure to continue filtration. Continued hypoperfusion of the kidneys leads to decreased urine output to retain cardiovascular volume, resulting in oliguria or anuria. Peripheral vasoconstriction may lead to increased cardiac ventricular preload. Should the myocardium become compromised, an increase in ventricular afterload may challenge the pulmonary vascular system with excess fluid that the ventricles cannot eject.

Respiratory Compensation

The respiratory system will attempt to compensate for inadequate tissue perfusion (oxygenation) or hypoxemia by increasing the rate of respiration. This process may well be hampered by cardiovascular decompensation, leading to decreased cardiac output and resultant fluid accumulation and pulmonary edema. Inadequate tissue perfusion (hypoxia) and hypercapnia will result, leading to central nervous system decompensation evidenced by a change in mental status that progresses to seizures, stupor, and coma.

Multisystem Failure

In severe cases without effective treatment, bacterial invasion may lead to septic shock syndrome with MODS. Eventually, the consequences of inadequate tissue perfusion, overextended compensatory mechanisms, and host cell damage will result in irreversible organ failure and death of the host.[4,12] Fig. 23.3 provides an overview of the primary pathologic processes and consequences of a bacterial infection leading to septic shock syndrome.

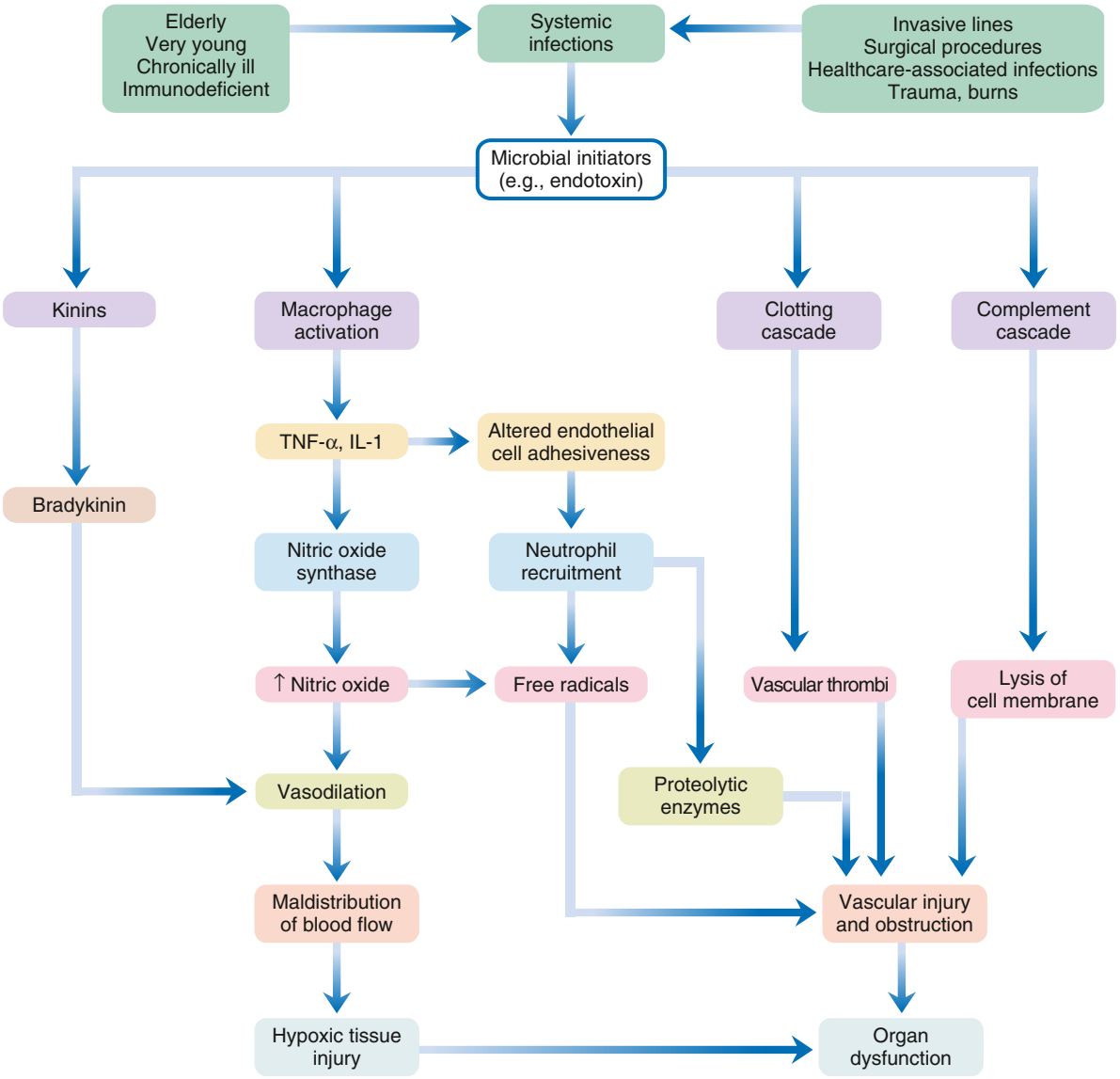

Fig. 23.3 Pathophysiological Process of Septic Shock. *IL-1*, interleukin 1; *TNF*, tumor necrosis factor. (Modified from Copstead, L.C., & Banasik, J.L. (2013). *Pathophysiology* (5th ed.). St Louis: Saunders.)

RISK FACTORS

Populations at Risk

Infectious diseases may cause health concerns for all individuals regardless of age, ethnicity, sex, socioeconomic status, geographic location, or prior health history. However, there are risk factors linked to some population groups based on age, socioeconomic status, and geographic location. Of the 10 leading causes of infant death in the United States, bacterial sepsis ranks seventh, and disorders related to short gestation and low birth weight rank second. Because an infant's immune system is immature at birth, any additional stress, such as low birth weight, further places the infant at risk for infection.[13–15]

The growing population of individuals with low socioeconomic status has increased the risk of infection for several reasons. Those who are uninsured or underinsured may be at risk for the consequences of absent or insufficient preventive health care. For example, if the cost of vaccinations is too expensive or the ability to access clinics where free vaccinations may be provided is not available, both children and adults can be at risk for acquiring infections from which they should be protected. Furthermore, this same population may not have the resources available to travel for preventive healthcare screenings or treatments for infection; purchase medicines; or buy food and food supplements that may contribute to health maintenance, disease prevention, and more rapid recovery from infections and other illnesses. Meanwhile, the prevalence of some diseases and infections is increasing in specific age or ethnic groups or in geographic locations worldwide, all of which influence the prevalence of infection in the United States.

Individual Risk Factors

Individual risk factors for infection are influenced by a number of variables. The immune status of the host is a very important risk factor, as is the type, frequency, and dose of exposure to microorganisms.

Compromised Host Because of Immunodeficiency

Individual risk factors for infection include being very young or elderly because these individuals have immune systems that are immature or become less responsive and efficient with age. Those who are immunocompromised are also at increased risk for infection. An immunocompromised state may develop as a result of genetic factors (primary immunodeficiency), malnutrition, preexisting infection with other pathogens (e.g., HIV or Epstein–Barr virus), acute or chronic psychological or environmental stress, use of medications that induce immunosuppression, and the presence of or treatment for cancer. These processes associated with immunodeficiency were discussed in Concept 21, Immunity.

Compromised Host Because of Chronic Illness

Chronic illness and associated treatments increase the risk for infection. In the United States infections accounted for three of the top ten leading causes of adult deaths in 2019, including chronic lower respiratory tract diseases, influenza and pneumonia, and nephritis.[15] Diseases such as diabetes, inflammatory disorders, cancers, and hepatic or respiratory disorders challenge the immune system and increase individual vulnerability to infection. Pathologic changes within affected body systems may alter the structural integrity of the system and create an environment conducive to infection, while treatment regimens are imposed that may also increase the risk of infection. Treatment strategies that require invasive lines (parenteral or other catheters), immunosuppressive medications (corticosteroids), antibiotics or antivirals, surgery, or intubation and mechanical ventilation provide avenues of entry for pathogenic organisms. Required treatment regimens associated with many chronic illnesses may lead to immunosuppression, further increasing the risk of individual infection.

Environmental Conditions

Exposure to unsanitary conditions may also make an individual vulnerable to a multitude of pathogens. Such pathogens may directly cause infection or challenge the immune system and increase the potential for infection upon future introduction of other microorganisms. Crowded living conditions increase the likelihood of the spread of disease and may contribute to less than optimal sanitation, both of which increase the potential for infection. Other environmental factors influence an individual's susceptibility to infection and include the presence or absence of clean food and water, conditions involving food preparation, and sufficiency of air ventilation.

ASSESSMENT

History

A health history includes questions to assess an individual's risk for infection and recognize symptoms associated with infection. Questions about the incidence of injury, known exposure to pathogens, and prior infections should be posed. Current or immediate past treatment for cancer, recent surgical procedures, the presence of autoimmune or immunodeficiency disease, and the use of immunosuppressant medication regimens must also be assessed. Travel should also be evaluated, particularly outside of the United States or to underdeveloped areas of the world that may expose the individual to pathogens in air, food, and water or to pathogens that are generally not found in the United States, such as smallpox. Other avenues of inquiry may include assessing incidences of interaction with larger groups of people, such as attending entertainment or sporting events where the close proximity of others may facilitate the transmission of infectious pathogens.

Symptoms of infection, verbalized by the patient, are often caused by an inflammatory response to infection, such as pain, swelling, or redness (see Concept 22, Inflammation); other clinical manifestations may be those associated with the effect of the infectious process on the body system. Specific symptoms are often determined by the affected organ, such as a cough with an infection of the respiratory system. Some symptoms are a result of general stress to the host, such as fatigue or malaise.

Examination Findings

Physical examination findings of particular importance in assessing for the presence of infection include fever, swelling, chills, malaise, redness or drainage in or around a wound, pain, and respiratory congestion. In general, clinical manifestations associated with infection parallel those of inflammation. Should infection with *C. difficile* or parasites be suspected, the presence of watery diarrhea, loss of appetite, nausea, and abdominal pain or tenderness should also be evaluated because these symptoms may be indicative of infection with these pathogens.

Diagnostic Tests

Laboratory and diagnostic studies are foundational to the diagnostic process for infections. Laboratory studies may be done on any type of body fluid or tissue and can confirm the presence of infection. Radiographic diagnostic tests provide additional information to understand the location and extent of infections.

Laboratory Tests

Complete blood count. Complete blood count with a white blood cell (WBC) differential count is one of the most critical laboratory tests to evaluate the presence of infection. Elevated levels of B and T lymphocytes, neutrophils, and monocytes are indicative of infection, particularly a bacterial or viral infection. Neutrophil counts are significantly elevated with bacterial infections and may lead to an increase in the number of band cells (immature neutrophils) when an infection is acute. Parasitic infections may result in an increase in the number of basophils and eosinophils; however, these two WBCs are not elevated in the presence of bacterial or viral infections.

Culture and sensitivity. A culture and sensitivity (C&S) test is done to identify the invading pathogen and to determine the antimicrobial most likely to be effective in treatment. This test can be done on any body fluid, tissue, or exudates and is critical in the management of infections. Some of the most common specimens for C&S are obtained from the genitourinary tract (urine culture), respiratory tract (sputum culture), oropharynx (throat culture), blood, wounds, and spinal fluid. Specimens may also be obtained from within the body during invasive

procedures or surgeries, or from invasive equipment such as intravenous lines, feeding tubes, endotracheal tubes, and indwelling urinary catheters. Nurses are often responsible for the collection of specimens for C&S; correct collection procedures must be followed to avoid sample contamination that leads to incorrect pathogen identification. Details of collection procedures are typically outlined in textbooks about laboratory and diagnostic procedures.

Other laboratory tests. Several other blood and body fluid screening tests are used to determine the presence of or evaluate an infection. These include C-reactive protein, erythrocyte sedimentation rate (ESR), and various serologic tests for the detection of a virus or antibodies against pathogens such as hepatitis, HIV, Epstein–Barr virus, severe acute respiratory syndrome (SARS), herpes simplex virus, syphilis, MRSA, *C. difficile,* and *Helicobacter pylori.*[16]

Radiographic Tests

Radiographic tests do not lead to an affirmative diagnosis of infection by themselves; confirmation occurs through clinical pathology analysis (gained through laboratory testing). Radiographic tests are useful in visualizing certain body tissues to gain insight to the possibility of an infection (if not yet diagnosed) and/or the extent and scope of some confirmed infections. Chest x-rays, computerized tomography (CT) scans, magnetic resonance imaging (MRI) scans, positron emission tomography scans, and indium-111 scans are examples of radiographic testing procedures that are useful in identifying areas of infection and inflammation within the body.[16]

CORE COMPETENCIES

Infection

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to infection.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to infection.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to infection for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to infection.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to infection.
- Demonstrate clinical judgment founded on broad knowledge of infection.

CLINICAL MANAGEMENT

Historically, the success in the prevention and treatment of infections has progressed dramatically with the introduction of antibiotics, the modernization of sanitation practices, the development of public health initiatives, and the spread of immunization programs. Morbidity and mortality rates for many infections have decreased substantially, with some infections being nearly eradicated worldwide. In the United States, smallpox vaccinations are no longer recommended, and poliomyelitis has nearly been eradicated with widespread vaccination protocols. Progress is being made in the development of vaccines for other diseases such as HIV, and a combined vaccination for smallpox and anthrax is being investigated.[4,17,18]

Success gained in the prevention and treatment of infections must also be tempered by the following facts: (1) some community- or healthcare-associated bacterial infections are now difficult to treat because of emerging antimicrobial resistance (e.g., MRSA and VRE); (2) the prevalence of healthcare-associated infections is increasing in the form of both MRSA and *C. difficile;* (3) tuberculosis remains one of the world's leading causes of death by an infectious disease; and (4) foodborne and waterborne bacteria (*Salmonella* and *Campylobacter*) continue to cause debilitating diarrheal disease throughout the world. After Alexander Fleming's discovery of penicillin in 1928, nearly a century of using increasingly more potent antimicrobials has resulted in bacteria and viruses that are resistant to even the most potent weapons in our arsenal. The National Institute of Allergy and Infectious Diseases (NIAID) issued a statement of concern about the increasingly difficult process of disease management given the microbial resistance that has emerged against some of the most powerful antimicrobials. NIAID particularly expressed concern related to treating staphylococcal infection, carbapenem-resistant *Enterobacteriaceae* (CRE), tuberculosis, gonorrhea, *Candida* infection, and *C. difficile* infections.[4,6,18,19]

Effective methods of protecting individuals and populations from exposure to infectious pathogens is well documented. However, lack of or incomplete implementation of infection control measures, including standard precautions, has led to the reemergence of many diseases thought to be eradicated or significantly diminished. Antimicrobial resistance, including multiple antibiotic resistant pathogen strains, has emerged as a significant consequence to their use from overprescribing, overuse or lack of completing a treatment regimen. Increasing development of new antibiotics, alternative forms of treatment, and new vaccinations for more pathogens is underway.[4] Continued research to find more powerful antimicrobials, while teaching the population about the consequences of overuse or inappropriate use of antimicrobials, will challenge healthcare providers and researchers for years to come.

Primary Prevention

Primary prevention involves a wide variety of infection control measures. Infection control has been defined by the World Health Organization as measures aimed at the protection of those who might be vulnerable to acquiring an infection, including both individuals residing in the community and persons receiving care for healthcare problems within a wide variety of settings. The basic tenant of infection control is identified as *hygiene* and encompasses such topics as patient safety, infection control and prevention in health care, injection safety, and food safety.[10,20]

Hand Hygiene and Standard Precautions

Following basic hand hygiene principles and adhering to Standard Precautions are the most effective methods of blocking transmission of infection in community and healthcare settings.

The Centers for Disease Control and Prevention (CDC) has published guidelines for infection control and hand hygiene within healthcare settings, as well as guidelines related to healthcare-associated infections. The guidelines are updated periodically and serve as excellent resources for ensuring adherence to infection control principles.[10]

The following are some recommendations for infection control proposed by the CDC: Keep hands clean by washing thoroughly with soap and water (for at least 20 seconds) or using an alcohol-based hand rub (for at least 15 seconds; not as effective if hands are visibly dirty or greasy), keep cuts and scrapes clean and covered with a bandage until healed, avoid contact with other people's wounds and bandages, and refrain from sharing personal items such as towels or razors. In athletic settings, participants should shower immediately after participation and before using whirlpools. Uniforms should be washed and dried after each use. In healthcare settings, prevention of infection requires following evidence-based principles of hand hygiene, standard precautions, and contact precautions. Visitors should follow hand hygiene principles and avoid touching wound dressings, catheters, or wound sites.[10,20]

Immunizations

Another significant primary prevention measure is vaccination. Worldwide, healthcare organizations have demonstrated various levels of success in providing vaccinations in an effort to eradicate some of the more devastating infectious diseases, such as polio and smallpox.[21,22] In 2020, several vaccines were developed to help combat the COVID-19 pandemic; however, uptake of the vaccine was challenging. Standard vaccinations in the U.S. arsenal to control the spread of disease through prevention of initial infection include those for human papillomavirus (HPV); hepatitis A and hepatitis B; varicella; measles, mumps, and rubella (MMR); influenza (annual); pneumococcus; tetanus, diphtheria, pertussis (Td/Tdap); and polio. Research continues worldwide to discover an effective vaccine for HIV.[17] Vaccinations are recommended for individuals across the lifespan; specific vaccination schedules are readily available from the CDC website (https://www.cdc.gov/vaccines/schedules).

Secondary Prevention (Screening)

Secondary prevention through disease screening is less effective in controlling infection, but is an opportunity to identify an infection for early treatment and to reduce transmission.

The areas of screening most strongly supported are those for the identification of sexually transmitted diseases such as bacterial infections (*Chlamydia trachomatis, Neisseria gonorrhoeae,* or group B *Streptococci*), viral pathogens (HIV, herpes simplex virus, hepatitis virus, or HPV), fungal pathogens (*C. albicans*), or protozoa (*Giardia lamblia*). Pap smears for sexually active women can be used as screening tools not only for cancer cells but also for the presence of HPV.

Collaborative Interventions

The management of infections requires both treatment of the infectious process itself and support for the affected body systems. The goal of treatment is to eradicate the infection, prevent secondary infections, and limit damage to the body. Many interventions are related to supporting affected body systems. The following infection control measures are critical for a rapid recovery and are universal in that they apply to infection treatment regardless of the system involved: know and follow the principles of effective hand hygiene; clean and disinfect environmental surfaces; and avoid close contact with infected individuals or crowded conditions in which bacterial or viral infections may be easily disseminated.

CLINICAL NURSING SKILLS FOR INFECTION

Hand hygiene
Personal protective equipment
- Gloves
- Mask
- Protective eyewear
- Gown
- Cap

Isolation precautions
Sterility
Collecting specimens for culture
Medication administration
Patient and family teaching/education

Antimicrobials

Treatments for infections begin with the use of antibiotics, antivirals, and other antimicrobials. Laboratory and diagnostic testing help to direct the healthcare provider to the appropriate antimicrobial. Instructing the infected individual to complete the full course of antimicrobial therapy helps to avoid a secondary infection or reemergence of infection because of inadequate initial treatment.

Antibiotic agents. There are several classifications of antibiotics based on bacterial spectrum and activity (bactericidal or bacteriostatic). Spectrum refers to the number of organisms affected by the antibiotic (i.e., broad-spectrum or narrow-spectrum antibiotic). Activity refers to the way in which the antibiotic kills bacteria. Bactericidal agents attack and kill the bacteria directly, whereas bacteriostatic agents interfere with replication of the pathogen. The common classifications of antibiotics are presented in Table 23.2. Antibiotics within a structural class generally have similar patterns of effectiveness, toxicity, and allergic potential.

TABLE 23.2 Classification of Antibiotic and Antiviral Agents

Antibiotics	Antiviral Agents
Penicillin	Adamantane
Cephalosporins	Antiviral chemokine receptor agonist
• First generation	Antiviral interferon
• Second generation	Neuraminidase inhibitors
• Third generation	Nonnucleoside reverse-transcriptase inhibitors
• Fourth generation	
Fluoroquinolones	Nucleoside reverse-transcriptase inhibitors
Tetracyclines	
Macrolides	Protease inhibitors
Aminoglycosides	Purine nucleosides

Antiviral agents. Like antibiotics, antiviral agents either kill viruses or suppress their replication, preventing their ability to multiply and reproduce. These agents are primarily used to minimize the severity of illness by limiting the viral spread. Common classifications of antiviral agents are presented (see Table 23.2).

Antifungal agents. Antifungal agents kill fungal organisms. Because there are various types of fungi that cause infection, multiple classifications of antifungal agents are available and include polyenes, imidazoles, triazoles, thiazoles, allylamines, and echinocandins.

Nutrition and Fluids

Replacement of fluids and electrolytes (oral or parenteral) is critical in the presence of fever, vomiting, or diarrhea. Adequate rest and nutrition provide the body with the energy needed for optimal functioning of the immune system and resolution of infection. Allowing time for rest and ensuring adequate fluids and nutritional intake are equally important.

INTERRELATED CONCEPTS

The concept of Infection is closely aligned with several concepts featured in this textbook. These interrelated concepts are presented in Fig. 23.4.

Immunity is critical in providing a level of surveillance for early identification of pathogen entry into the body. The immune system is the first line of defense against infection and the body's primary method of response to an invading organism. **Inflammation** is part of the body's response to a foreign antigen, with many of the symptoms of infection being those of the body's inflammatory response (redness, swelling, and pain). **Tissue Integrity** is critical to avoiding infection, with the skin being the largest component of the immune system. Intact tissues are less vulnerable to pathogen entry and form natural barriers to infection. As noted previously, the concept **Stress and Coping** is linked because stress challenges the immune system and makes it more vulnerable to damage, less able to respond effectively and efficiently to pathogen invasion, and more difficult for the body to respond to treatment for an infection. Finally, maintaining adequate **Nutrition** and rest are also necessary for the body to respond to active infection treatment regimens and to support the work of an immune response.

CLINICAL EXEMPLARS

Table 23.1 identifies examples of common pathogens that cause infection. A variety of infections have been presented as recurring, emerging, resistant, and global. Box 23.1 presents some of the more commonly occurring infections by body system. Some of the most common or important exemplars are briefly described.

Featured Exemplars

Pneumonia

Pneumonia is an infection in the lungs that may range from mild to severe and occurs in people of any age, gender, or ethnicity. Worldwide, it is the leading cause of infectious death in children younger than age 5 years.[23] A person's potential for developing pneumonia is diminished with proper hand hygiene and by disinfecting frequently touched surfaces, not smoking, not having underlying diseases (such as diabetes or heart disease), and being vaccinated with the pneumonia vaccine. Pneumonia symptoms include chest tightness, shortness of breath, difficulty breathing, cough, and fever, and the disease is treated with antibiotics and antiviral drugs.[23]

Conjunctivitis

Commonly called "pink eye," conjunctivitis is characterized by redness and swelling of the conjunctiva, thick discharge from the eye with crusting on the eyelids or lashes, and itchy, inflamed eyes. Pain is not typically associated with the infection. Conjunctivitis is common in children and adults and is easily spread from one person to another. When one child in a family is diagnosed with conjunctivitis, all children are commonly treated as a prophylactic measure. In the newborn, conjunctivitis occurring within the first 3 weeks of life is often caused by gonococcal or chlamydial infections of the mother and, if left untreated, may lead to blindness.[24]

Otitis Media

Otitis media may be classified into one of three types: acute otitis media (AOM), otitis media with effusion (OME), and otitis

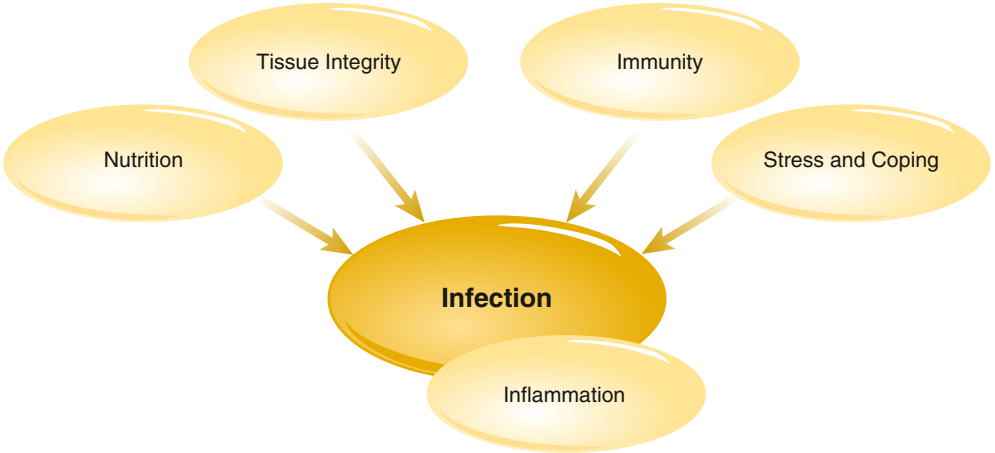

Fig. 23.4 Infection and Interrelated Concepts.

BOX 23.1 EXEMPLARS OF INFECTION

Neurologic
- Encephalitis
- Meningitis

Respiratory
- Pneumonia
- Respiratory syncytial virus

Cardiovascular
- Endocarditis
- Myocarditis

Eyes
- Conjunctivitis

Ears
- Otitis media

Skin
- Cellulitis
- Methicillin-resistant *Staphylococcus aureus*
- Pressure injuries
- Surgical wounds

Gastrointestinal
- *Clostridioides difficile*
- Gastroenteritis
- Hepatitis
- Tapeworm

Genitourinary
- Cystitis
- Pyelonephritis
- Urinary tract infection

Reproductive
- *Candida albicans*
- *Chlamydia trachomatis*
- Group B Streptococci
- Herpes simplex virus
- Human papillomavirus
- *Neisseria gonorrhoeae*

Systemic
- HIV
- Measles
- Mumps
- Sepsis

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externa (Swimmer's ear). Guidelines require differentiation of OME and AOM and the patient's age to determine appropriate antibiotic use. AOM is usually painful and often requires treatment with antibiotics. Other symptoms include redness of the tympanic membrane, pus, and fever. AOM may also be a consequence of other infections such as measles, mumps, or pneumonia. OME is a buildup of fluid in the middle ear without symptoms of infection and is often caused by viral upper respiratory infections and allergies, generally resolving on its own. Swimmer's ear is an infection of the ear and outer ear canal. Treatment with antibiotics is usually required.[25]

Hepatitis

Hepatitis is inflammation of the liver and generally refers to one of three viral causative agents: hepatitis A virus (HAV), hepatitis B virus (HBV), and hepatitis C virus (HCV). It is the leading cause of liver cancer and the most common cause of liver transplantation. The CDC estimates that only 50% of HAV, 15.4% of HBV, and 7.2% of HCV cases are diagnosed and reported. The incidence of HAV increased 1325% from 2015 to 2019 because of person-to-person outbreaks among people who use drugs and those experiencing homelessness. Since 1990, effective vaccination strategies have led to a decrease in the incidence of acute HBV; however, the incidence of acute HCV has been on the rise each year, with a 133% increase from 2012 to 2019. Furthermore, significant underreporting of HBV and HCV is acknowledged as a result of asymptomatic infections. Acute onset of symptoms is discrete and includes nausea and vomiting, fever, malaise, dark urine, and jaundice. Ascites develops later in disease progression.[26]

Human Papillomavirus (HPV)

HPV is the most common sexually transmitted infection, with more than 40 types, and is typically passed through genital contact during vaginal, anal, or oral sex. Symptoms may develop years after exposure and may lead to genital warts and cancer. HPV tests can be used to screen for cervical cancer. A vaccination is available to men and women against the types of HPV that most often lead to cancer, and is recommended for routine vaccination at age 11 or 12 years (and can be started at age 9 years). The CDC's Advisory Committee on Immunization Practices recommends vaccination for everyone through age 26 years if they were not vaccinated when younger. Two doses are recommended, with the second dose given 6 to 12 months after the first dose. The CDC estimates that most sexually active men and women will get at least one type of HPV sometime in their life.[27]

Urinary Tract Infection

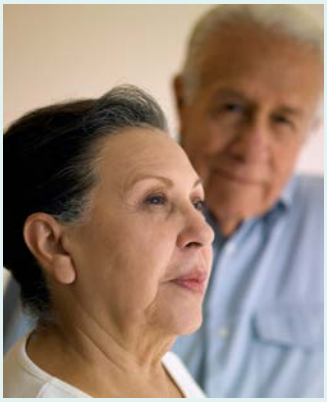
Urinary tract infections (UTIs) are common in hospitalized patients, especially those with an indwelling urinary catheter. These infections occur when bacteria, generally from the skin or rectum, enter the urethra, affecting parts of the urinary tract such as the bladder (cystitis) or kidneys (pyelonephritis). According to the CDC, UTIs are the fifth most common type of health care–associated infection. Urinary tract infections are more prevalent in those who are pregnant, older age, or those who have poor hygiene. Symptoms can include pain or burning with urination, urgency to urinate, or having bloody urine, which can accompany fever, chills, back pain, or nausea and vomiting. If a UTI is catheter-associated (CAUTI), the first step is to remove the indwelling urinary catheter. Those with a UTI are generally treated with antibiotics and are recommended to stay well hydrated.[28]

Coronavirus

Coronavirus (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Disseminated by airborne particles and

droplets, COVID-19 causes respiratory symptoms similar to the flu or pneumonia, such as fever, cough, fatigue, loss of taste or smell, sore throat, or headache. Although most people who contract COVID-19 have mild symptoms, severely ill individuals are hospitalized, many needing mechanical ventilation or support with extracorporeal membrane oxygenation. COVID-19 was responsible for over 884,000 deaths in the United States and 3.7 million deaths worldwide by the end of 2021. COVID-19 vaccination reduces the severity of illness among those infected.[29,30]

CASE STUDY



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Case Presentation

Mrs. Bovier is a 72-year-old woman who recently spent 5 days in the hospital for pneumonia, where she received intravenous antibiotics and respiratory therapy. She was discharged 1 week ago and has been at home with her older adult husband, who assists in her care. She has arthritis and typically is not very physically active.

Mrs. Bovier returned to her primary care provider for a checkup and complained of increasing difficulty breathing, headache, and coughing up yellowish-colored sputum. On examination, she was found to have a low-grade fever; chest auscultation revealed areas of atelectasis; oxygen saturation ($Pa0_2$) was 91%; and she was diaphoretic. A sputum specimen was obtained for culture and sensitivity that later revealed the presence of *Streptococcus pneumoniae*. Chest x-ray confirmed pulmonary congestion and atelectasis. Laboratory analysis showed an elevated white blood cell count, the presence of band cells (immature neutrophils), and an elevated erythrocyte sedimentation rate.

Mrs. Bovier was again hospitalized because of the severity of her respiratory distress; the need for intravenous antibiotics to manage the pulmonary infection; and the need for pulmonary therapy to assist in resolving her pulmonary congestion. Mrs. Bovier's age and lack of physical activity are complications that may influence pneumonia treatment, requiring a more watchful course of initial therapy.

Hospital care for Mrs. Bovier included instruction in methods to improve the productivity of her cough (such as incentive spirometry), humidified oxygen to assist with loosening secretions while improving ventilation, and respiratory therapy to help with expectoration and to facilitate lung expansion and air exchange. She received intravenous vancomycin, mucolytic agents, a bronchodilator, and expectorants to treat her pulmonary disease and assist in breathing.

Upon discharge, Mrs. Bovier received instructions in the proper technique for effective hand hygiene; the importance of avoiding large crowds of people as well as areas where people are smoking, to diminish her exposure to irritating respiratory stimuli; and the need to increase her physical activity, including frequent ambulation in her home, to help stimulate deep breathing and avoid peripheral vascular clot formation. She demonstrated understanding of her medication regimens and the need to maintain adequate food and fluid intake to support her immune system and to provide energy while healing. The need for rest to promote healing was also emphasized. Finally, Mrs. Bovier was instructed on the warning signs of recurring pulmonary disease or dysfunction.

Case Analysis Questions

1. What risk factors does Mrs. Bovier have that put her at risk for the development of pneumonia?
2. What clinical findings did Mrs. Bovier have consistent with the concept of Infection?

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CONCEPT 24

Mobility

Jean Foret Giddens

The 10-month-old infant taking his first steps, the 6-year-old girl riding a bicycle, the high school athlete "dunking" the basketball, the newly married couple dancing at their wedding, the 50-year-old man walking his dog, and the 76-year-old grandmother knitting a scarf demonstrate various examples of mobility accomplished through functions of the musculoskeletal and nervous systems. As a basic physiologic process, mobility is required for optimal health. Changes in mobility can significantly affect biophysical health, psychosocial health, and functional status. Nurses should be familiar with interventions to promote optimal mobility, prevent situations leading to immobility, and minimize complications when immobility occurs.

DEFINITION

Mobility refers to purposeful physical movement, including gross simple movements, fine complex movements, and coordination. Mobility is dependent on the synchronized efforts of the musculoskeletal and nervous systems, as well as adequate oxygenation, perfusion, and cognition. Specifically, mobility requires adequate energy, adequate muscle strength, underlying skeletal stability, joint function, and neuromuscular coordination to carry out the desired movement. For the purposes of this concept presentation, mobility is defined as a "*state or quality of being mobile or movable.*"[1, p.1479] There are many variations on the term *mobility* seen throughout the literature that are worth mentioning. The term *immobility* refers to an inability to move. Impaired physical mobility describes a state in which a person has a limitation in physical movement but is not immobile. *Impaired physical mobility*, as defined by the North American Nursing Diagnosis Association (NANDA), is a "limitation in independent, purposeful movement of the body or of one or more extremities."[2] Although immobility is typically considered to be a negative state, there are times when immobility or immobilization is therapeutic. For example, the immobilization of a shoulder if it has been dislocated provides desired rest, recovery, and comfort.

The term *deconditioned* is used to describe a loss of physical fitness. This applies not only to an athlete who fails to maintain an optimal level of training but also to an individual who does not maintain optimal physical activity. In the context of health care, this term applies to patients who experience extended periods of immobility (e.g., after prolonged bed rest), resulting in an overall deconditioned state of the musculoskeletal and cardiopulmonary systems. This is particularly a problem among older adults. A similar term, *the disuse syndrome,* first proposed in the 1980s by Bortz, describes the predictable adverse effect on body tissues and functions associated with sedentary lifestyle and inactivity; identifying characteristics of the disuse syndrome, as defined by Bortz, included cardiovascular vulnerability, obesity, musculoskeletal fragility, depression, and premature aging.[3]

SCOPE

As a concept, the scope of mobility ranges from full mobility, to partial mobility (also referred to as *impaired mobility*), to complete immobility; the scope is considered to be a continuum as opposed to three categories (Fig. 24.1). Mobility can also be considered from a micro or macro perspective. From a micro perspective, mobility and immobility may refer to a particular part of the body (e.g., an arm or a leg); from a macro perspective this can refer to mobility and immobility of the entire body. Thus, mobility and immobility are not mutually exclusive; for example, a patient with an immobilized extremity can be mobile. Also, because mobility is a continuum, a change in mobility may be temporary.

The scope of mobility is also evident when considering its presence within multiple nursing diagnoses. A total 16 NANDA nursing diagnoses are related to the concept of mobility including decreased activity intolerance, risk for decreased activity intolerance, impaired mobility, impaired bed mobility, impaired wheelchair mobility, impaired sitting, impaired standing, impaired transfer ability, and impaired walking, risk for falls (adult and child), pressure injury (adult and child), risk for pressure injury (adult and child), and risk for disuse syndrome.[2]

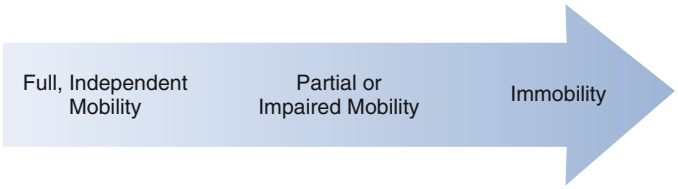


Fig. 24.1 Scope of Concept: Mobility.

NORMAL PHYSIOLOGICAL PROCESS

Optimal mobility relies on bones, joints, articular cartilage, tendons and ligaments, skeletal muscle, and the mechanics of muscle contraction. Underlying these functions is an intact neurologic system whereby signals for all movement are communicated to and from the brain through nerve impulses.

Neurologic System

All movement is coordinated by the brain through a complex process of sensing internal and external data signals, integrating these data signals, and responding by triggering motor activity. The motor cortex in the frontal lobe of the brain is responsible for voluntary motor activity through a series of nerve impulses sent from the brain, through the spinal cord and peripheral nerves, to the target muscle. The cerebellum, located at the base of the brain, coordinates movement, equilibrium, muscle tone, and proprioception.

Musculoskeletal System

Bones

The skeleton has three overarching roles relating to mobility:

1. It serves as the structural foundation for the body and as leverage to move body parts.
2. It supports and protects tissues and internal organs.
3. It provides attachment sites for muscles and ligaments.

Bones also serve as a storage center for calcium and as a production center for red blood cells within the bone marrow.[4] The human body has 206 bones, which are classified into two groups: the axial skeleton (bones that comprise the skull, thorax, and spinal column) and the appendicular skeleton (bones that comprise the upper and lower extremities).

All structures designed for use over time require ongoing maintenance and intermittent repair. The same is true for the skeletal system. *Remodeling* is a term that describes ongoing maintenance of bone tissue through a process in which new bone tissue replaces existing bone tissue in bone-remodeling units.[5] The remodeling process also provides the mechanism to repair injured bones (e.g., a fracture). Remodeling requires adequate nutrition, hormonal regulation, and blood supply. The severity of the bone injury and the availability of remodeling elements influence the rate or speed at which injured bone heals.

Joints

Bones come together at joints. Joints provide stability to bones and allow skeletal movement. Mobility is affected by the degree of joint freedom; joints allow for skeletal positioning to carry out the desired action. The various types of movement provided by joints include flexion, extension, rotation, adduction, abduction, supination, and pronation. Some of the most common problems associated with mobility arise as a result of joint pain and/or changes in joint function.

Three classifications of joints (based on stability and movement) include synarthrosis joints (nonmovable), amphiarthrosis joints (slightly movable), and diarthrosis joints (freely movable).[5] Joints are also classified by structure. Fibrous joints serve to hold bones together in place with connective tissue. For example, the tibia and fibula are held together by a fibrous ligament. Cartilaginous joints feature cartilage material that holds the joint together and provides some movement. For example, ribs are attached and held to the sternum by cartilaginous material, allowing movement for the process of breathing while providing chest stability required for the breathing process. Joints that allow the most movement are also the most complex. Synovial joints have multiple elements, including a joint capsule, synovial membrane, joint cavity, synovial fluid, and articular cartilage. Articular cartilage acts as a cushion by distributing joint loads over a wide area, thereby reducing prolonged compression of articulating bones within the joint. Without cartilage, significant friction and pain result from joint movement.

Muscles

Skeletal muscle differs from other types of muscle in the body in many ways, but one of the most important differences is that it is under voluntary control.[4] Optimal skeletal muscle function depends on five factors: nerve impulses reaching the muscle, muscle fibers' response to nerve stimulus, proprioception, mechanical load, and joint mobility. Impairment of any one of these factors negatively affects purposeful movement.

Nerve impulses reach skeletal muscle from the spinal cord and peripheral nerves via motor neurons. The motor neurons innervate a group of muscle fibers known as the motor or muscle unit. There are many different types of muscle fibers within a muscle unit depending on the function and type of responsiveness required. Muscles that maintain body posture do not have the same need for quick responsiveness that the ocular muscles do, for example, but are less sensitive to fatigue.

Muscle movement occurs in response to nerve stimulation of the muscle fibers that triggers muscle contraction. On a cellular level, the functional units of muscle contraction are myofibrils. Movement occurs in a reciprocal manner among muscle groups. If one group contracts, another group must relax. For example, flexion of the elbow to move the forearm up requires contraction of the biceps muscles and relaxation of the triceps muscles; likewise, extension of the elbow joint requires contraction of the triceps muscles and relaxation of the biceps muscles. If both are contracted at the same time, no movement occurs.

Proprioception is the mechanism that provides a sense of position and movement; this process allows for accuracy in the degree of movement with muscle contraction. Mechanical load of movement is associated with having adequate strength within the muscle group to carry out the desired task. For example, most humans would struggle to pick up a 250-lb object and walk 50 ft with it. However, such a feat is entirely possible for individuals who are well conditioned for this.

Age-Related Differences

Significant changes to the musculoskeletal system occur throughout infancy and childhood as a function of growth and

development. The appendicular skeleton (extremities) grows faster than the axial skeleton (head, thorax, and spine)—partly because the appendicular skeleton is disproportionately shorter than the axial skeleton. Throughout infancy, childhood, and adolescence, bones change in composition, grow in length and diameter, and undergo changes in rotation and alignment. Similarly, the size and composition of muscles undergo changes as a result of physical growth and development throughout childhood, and they are a major factor in weight gain during adolescence.[5,6] The rapid and significant musculoskeletal changes, along with the maturation of the neurologic system during infancy and childhood, result in not only increased gross motor capability but also refined coordination and precision with movement. These changes underlie many of the key developmental stages and milestones.

A number of musculoskeletal changes also occur with aging. In the spinal column, thinning of vertebral disks, shortening of the spinal column, and onset of kyphosis with spinal column compression occur. Bone density decreases causing bones to become brittle (particularly in females), leaving older adults more susceptible to fracture. Cartilage becomes rigid and fragile, and there is a loss of ligament resilience and elasticity. Muscle mass and tone decrease significantly in late adult years. Cumulatively, these changes result in reduced mobility and/or mobility impairment attributable to reduced range of motion and pain in joints, reduced muscle strength, and increased risk for bone fracture.[4]

VARIATIONS AND CONTEXT

Variations in mobility are seen among individuals across the lifespan, with multiple causative factors and a wide range of degree of effect and duration. Changes in mobility can be temporary, long term, or permanent and are influenced by general health status, with specific conditions associated with the neurologic or musculoskeletal system (Fig. 24.2). Restrictions in mobility may also be indicated after a medical procedure or diagnostic test.

An individual's general health status has significant influence on mobility. Many conditions lead to changes in mobility, including acute illness or injury (e.g., influenza or fracture), debilitating chronic conditions (particularly cardiovascular and pulmonary conditions leading to fatigue), and conditions involving end-of-life care (e.g., cancer or dementia). Conditions that specifically lead to mobility impairment include neurologic (conditions of the brain, the spinal cord, and the peripheral nerves), musculoskeletal (conditions of the bones, joints, and muscles), or a combination of both (neuromuscular conditions). Conditions in these three categories can be caused by congenital defects, genetic conditions, injury, inflammation, infection, autoimmune disorders, and neoplasms. Medical procedures (e.g., surgery) and diagnostic tests may require temporary restrictions on mobility to reduce complications.

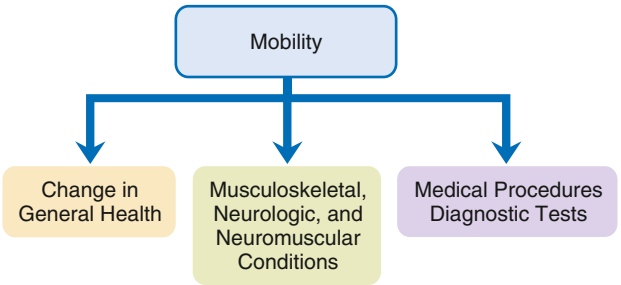


Fig. 24.2 Categories Leading to a Change in Mobility.

CONSEQUENCES

Attaining and/or maintaining mobility is paramount to health. The human body was designed to move; thus, when movement is limited, consequences occur. The degree of consequence is largely dependent on the degree of mobility impairment and length of time the impairment exists. As a general rule, the greater the extent and length of time of immobility, the greater the physiological consequences. A state of complete immobility has a significant effect on the entire body; literally all body systems are affected (Table 24.1).

Cardiovascular Complications

Cardiovascular complications occur both with central and with peripheral perfusion. A lack of physical activity results in reduced cardiac capacity. According to one study, a 15% reduction in muscle mass will occur after 12 weeks of complete immobility.[7] This translates to reduced force of cardiac contraction and a reduction in cardiac output. The loss of endurance and the deconditioned state present challenges when the resumption of physical activity is desired.

Problems also occur within the vascular system. Decreased efficiency of orthostatic neurovascular reflexes and diminished vasopressor mechanism cause orthostatic hypotension intolerance when an individual attempts to attain an upright position, because of blood pooling in the extremities.[5] Adequate perfusion and venous return depend on skeletal muscle contraction and frequent changes in body position. Because muscular contraction (particularly in the legs) facilitates venous return, venous stasis occurs during periods of inactivity. Slowed blood

TABLE 24.1 Consequences of Immobility

System Affected	Physiological Effect and Potential Complications
Cardiovascular system	Reduced cardiac capacity
	Decreased cardiac output
	Orthostatic hypotension
	Venous stasis
	Deep vein thrombosis
Respiratory system	Recued lung expansion
	Atelectasis
	Pooling of respiratory secretions
Musculoskeletal system	Reduction in muscle mass and atrophy
	Contracture of joints
	Bone demineralization
Integumentary system	Skin breakdown
Gastrointestinal system	Reduced peristaltic motility
	Constipation
Urinary system	Renal calculi
	Urinary stasis
	Infection

flow provides an opportunity for the formation of blood clots. Deep vein thrombosis is a relatively common complication associated with immobility.

Respiratory Complications

Physical activity is associated with full lung expansion, particularly among those engaging in exercise. Immobility contributes to reduced lung expansion and eventually leads to atelectasis (an airless state of the alveoli) and reduced capacity for gas exchange. Pooling of respiratory secretions, coupled with a reduced cough effort, places the immobilized patient at risk for stasis pneumonia.

Musculoskeletal Complications

Maintaining muscle tone, joint range of motion, and bone density requires active skeletal contraction and weight bearing. Skeletal muscle adapts to nonuse by reducing mass. Thus, prolonged immobility leads to significant reductions in muscle mass and atrophy; in fact, an average loss of 25% muscle mass occurs with permanent immobility.[7] The lack of activity leads to contracture in the joint, primarily as a result of muscle shortening. Muscle atrophy and joint contraction are particularly concerning because together these negatively affect functional ability.

A lack of weight bearing leads to bone demineralization and calcium loss from the skeletal system. The degree of bone demineralization and calcium depletion is related to the severity and duration of immobility and the degree of weight-bearing ability. Over time, osteoporosis can develop in response to immobility.

Integument System

Sustained pressure on the skin reduces perfusion to the tissues. A reduced flow of oxygenated blood causes hypoxemia of the tissues and increases the risk for skin breakdown. Individuals who lack the ability to move in bed have increased risk not only because of pressure but also because of shearing forces that often accompany certain positions or occur during transfers. These problems are further exacerbated if the patient has a poor nutritional status and is incontinent. Development of pressure injury to the skin can result.

Gastrointestinal Complications

Constipation is a frequently reported complication of immobility for several reasons. First, not being able to assume an optimal upright position makes having a bowel movement more challenging; for many people, relying on the assistance of others to have a bowel movement is embarrassing and may lead to reluctance in acting on the urge. From a physiological standpoint, the gastrointestinal tract slows during states of immobility, resulting in reduced peristaltic motility. Constipation, reduced appetite, and anorexia negatively affect nutritional status.

Urinary Complications

Immobility leads to three common problems that occur within the urinary system: renal calculi, urinary stasis, and infection. Renal calculi result from stasis of urine in the renal pelvis and because of increased circulating serum calcium levels (as a result of bone reabsorption). The bladder loses tone, making it difficult to completely empty the bladder, particularly when voiding while in a lying position. This often results in urinary tract infection because the presence of urinary stasis provides an optimal environment for the growth of bacteria.

Psychological Effects

Acute and chronic psychological conditions that result from immobility include boredom, depression, feelings of helplessness/hopelessness, grieving, anxiety, anger, disturbed body image, and decreased verbal and nonverbal communication. Individuals who are unable to work or are even unable to meet basic activities of daily living often experience a loss of self-worth or value associated with the role change. Social isolation and mood disturbances are common.

The psychological effects of immobility are especially concerning among children. Physical activity is integral to daily activity for children. It is essential for their physical growth and development, and it is central to expression, communication, and making sense of the world around them. Thus, immobilization can interfere with a child's intellectual and psychomotor function. Emotional responses can range from anger and aggressive behavior to passive quiet demeanor and withdrawal. Developmental regression is common. Children often become less communicative and may experience depression; in some cases, hallucinations occur.[6]

RISK FACTORS

Populations at Risk

All individuals are potentially at risk for altered mobility regardless of age, ethnicity, race, or socioeconomic status. Because of the effects of aging, the population group at greatest risk for impaired mobility is older adults. Physiologic changes predispose older individuals to a greater incidence of falls and greater challenges in regaining full mobility after a period of impaired mobility. An estimated 95% of hip fractures are a result of falling, and 76% of hip fractures occur among older adult women.[8]

Individual Risk Factors

Individual risk factors for changes in mobility are often attributed to acute and chronic conditions, chronic pain, and injury/trauma. Specifically, individuals with orthopedic injuries, congenital deformities, neurologic disorders, strokes, head injuries, spinal injuries or deformities, nutritional deficiencies, cardiopulmonary conditions, and end-stage cancer are particularly susceptible. Because substance use disorders are more prevalent among individuals suffering from major trauma as compared to the general population[9], indirectly substance use is a risk for mobility impairment. Side effects and adverse effects of many medications (e.g., corticosteroids and chemotherapy) and medical treatments can also affect mobility.

ASSESSMENT

History

The history, as it relates to the concept of Mobility, includes general health information (past health history, medications, and surgery/treatments) and social history (lifestyle, employment, family assessment, and activities of daily living) as a starting point.[10] In addition, the history includes an investigation of specific symptoms experienced by the patient. For infants and children, the parents are asked about gross and fine motor developmental milestones, or regression in previous achieved milestones.

Areas of questions specific for mobility include

- Presence of pain with movement
- Recent changes in mobility or problems with balance
- Presence of fatigue
- Recent falls
- Recent changes in ability to complete activity of daily living

Risk assessment tools may also be incorporated as part of the history as appropriate. As one example, the Fracture Risk Assessment Tool predicts a patient's 10-year risk of fracturing a major bone (hip, spine, shoulder, or forearm). Data gained from the history are entered into the tool to gain a risk prediction.[11]

Examination Findings

Objective data regarding the assessment of the musculoskeletal system include an assessment of gait and body posture; joints; size, symmetry, and strength of muscles; and range of motion of joints.[10] Pediatric assessment also involves observation of motor activities as related to developmental milestones.[6]

Expected findings for adults include erect posture and symmetric extremities. Gait should be smooth, coordinated, and balanced. The spine should be straight with expected curvatures. Muscles and joints should be assessed for size, symmetry, strength, range of motion, and stability. Comparisons are made between right and left sides.[10] Assessment of muscle strength is done using a muscle strength scale (0, no detection of muscular contraction; 5, full muscle strength). Findings considered abnormal include observed deformity of any bone or joint, edema, ecchymosis, localized warmth and redness, a loss of function, numbness, guarding (because of pain), and limitations in movement or mobility. Further information related to conducting an examination of the musculoskeletal system can be found in physical assessment textbooks.

Diagnostic Tests

Many diagnostic tests are used to evaluate musculoskeletal disorders. These are briefly described next.

Radiographic Diagnostics

- *X-ray:* evaluates the integrity of bones and joints and is the most common radiographic test used to diagnose fractures.
- *Computed tomography scan:* identifies soft tissue and bony abnormalities and evaluates musculoskeletal trauma.
- *Magnetic resonance imaging:* uses radio waves and magnetic fields to provide an image of soft tissue. This is used most efficiently to evaluate soft tissues, such as a vertebral disk, tumor, ligaments, and cartilage.[12]
- *Myelogram:* a radiographic study of the spinal cord and nerve root using a contrast dye. This is particularly useful in the evaluation of individuals with back pain.
- *Arthrography (arthrogram):* visualization of a joint by the injection of a radiopaque substance into the joint cavity, allowing for the evaluation of bones, cartilage, and ligaments. This is most commonly performed on the knee and shoulder joints, but it also can be done on hips, ankles, and wrists.[12]
- *Bone Densitometry:* a diagnostic test used to determine bone mineral density (the core mineral content and the density of bone). This test is used for the diagnosis of osteoporosis and osteopenia. Although there are several approaches, dual-energy x-ray absorptiometry (DEXA) is the most common.
- *Bone scan:* evaluates the bone uptake of a radionuclide material; the uptake is related to the metabolism of the bone. The primary indication of this test is to detect metastatic cancer in the bone,[12] but it is also used to evaluate avascular necrosis or unexplained bone pain.

Other Diagnostic Tests

- *Arthroscopy:* a procedure that allows direct visualization of the interior of a joint through an endoscope. This procedure is most commonly performed on the knee, but it can be done on other joints as well.
- *Arthrocentesis:* a procedure involving the aspiration of fluid from a joint (synovial fluid) for diagnostic study to determine the presence of infection, inflammation, blood.
- *Electromyography:* an evaluation of electrical activity generated within the muscle. This is used to determine the quality of neuromuscular innervation.
- *Laboratory tests:* used to provide various types of information about the functional state of muscles, bones, or joints. Types of tests include blood tests (e.g., alkaline phosphatase, calcium, phosphorus, uric acid, creatine kinase, blood urea nitrogen, creatinine, and myoglobinuria), analysis of joint fluids, and pathologic analysis of biopsied tissue (e.g., a muscle biopsy or bone biopsy).

CORE COMPETENCIES

Mobility

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to mobility, physical activity, and immobility.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to mobility.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to mobility and physical activity for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to mobility.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to mobility and injury prevention.
- Demonstrate clinical judgment founded on broad knowledge of mobility and physical activity.

CLINICAL MANAGEMENT

Clinical management related to mobility includes health promotion, screening, and the management of emerging or presenting conditions that compromise mobility. Ultimately, the goal is to optimize mobility.

Primary Prevention

Regular physical activity is associated with multiple health benefits and is foundational to primary prevention measures.[13,14] Prevention of problems associated with mobility is relatively simple—that is, maintaining the highest level of regular physical activity possible along with optimal nutrition, keeping an ideal body weight, and getting adequate rest. Taking measures to prevent injury and trauma are also considered primary prevention strategies.

Nutrition, as a primary prevention strategy, links to musculoskeletal development. During infancy, childhood, and adolescence, adequate protein and calcium in the diet are critical for the musculoskeletal development described previously. Adequate calcium intake is also necessary to prevent osteoporosis among older individuals. Maintaining a healthy body weight prevents excessive joint strain and is associated with fewer problems with back pain. Falls represent one of the most common mobility problems among older adults; thus, fall prevention is an important aspect of primary prevention. Strategies include participating in regular physical activity (to maintain muscle strength and balance), making the environment safer (e.g., avoiding hazards, using hand rails, wearing sturdy shoes with nonslip soles, and having adequate lighting), and optimizing vision.

Secondary Prevention (Screening)

The primary areas to highlight related to mobility and screening are osteoporosis, mobility screening, and fall risk assessment. For osteoporosis screening, the U.S. Preventive Services Task Force (USPSTF) recommends screening women age 65 years or older for osteoporosis with bone measurement testing to prevent osteoporotic fractures.[15] Among postmenopausal women under 65 years, screening is recommended for those with increased risk of osteoporosis. In younger women who have increased fracture risk, dual-energy x-ray absorptiometry (DXA) of the hip and spine is the recommended method to measure bone density. There is no recommendation for the screening interval. Furthermore, USPSTF concluded that evidence is insufficient to recommend screening for men.[15]

A large number of mobility and fall risk assessment screening tools are available. A meta-analysis determined that that two assessment tools used together (as opposed to using a single tool) provide a better evaluation of fall risk among older adults.[16] One of the most common screening tests is the Timed Get Up and Go test, which measures mobility in people who are able to walk on their own.[17] Another common screening is the Performance-Oriented Mobility Assessment test,[18] which aids in the identification of gait and balance impairments. Mobility scales, such as the Mobility Ability Quotient, are also used to assess mobility progress in inpatient and rehabilitation settings.[19]

Collaborative Interventions

Numerous interventions for the care of individuals with limitations in mobility exist and are usually presented based on the underlying medical condition or diagnosis. Interventions specific for a health condition associated with changes or loss in mobility often overlap. From a conceptual perspective, a general discussion of interventions delivered by various members of the healthcare team that address mobility impairments includes several categories, such as care of the immobilized patient, exercise therapy, pharmacologic agents, surgical interventions, immobilization, and assistive devices.

Patients with impaired mobility are at risk for injury when interventions are not carried out properly. Likewise, healthcare workers caring for patients with mobility impairment are at risk for occupational injury—often caused by manually moving a patient. National standards for safe patient handling and mobility, are designed to improve the safety of patients and healthcare workers. The standards, developed by an interprofessional working group, are intended to provide a blueprint to adopt a safe patient handling and mobility program that can be adapted to any healthcare setting and with any patient population. Included in the standards are establishing a culture of safety, education and training; the application of ergonomic principles in the care environment; patient-centered assessment; and the integration of safe patient handling technology in the care environment.[20]

CLINICAL NURSING SKILLS FOR MOBILITY

- Assessment
  - General assessment
  - Mobility assessment
- Patient handling/transfers
- Positioning
- Range-of-motion exercises
- Continuous passive motion
- Sequential compression device and elastic stockings
- Ambulation
- Assistive devices
  - Cane
  - Crutches
  - Walker
  - Wheelchair
- Patient-handling technology
  - Mats
  - Slings
  - Lifts
- Traction
- Heat and cold therapy
- Immobilization devices
- Medication administration

Care of an Immobilized Patient

An important overarching principle to emphasize is the need for early mobility. Early mobility requires a cultural mindset among interdisciplinary teams to overcome challenges and barriers associated with patient mobility. A study assessing barriers to early mobility among patients in an intensive care unit found that approximately 50% of barriers were patient-related (excessive sedation or delirium, morbid obesity, and multiple invasive devices), but a variety of care delivery factors represented process-related barriers (fragmented care, lack of availability of

adequate equipment, time constraints, inadequate number of providers, and concerns for patient safety) and other barriers (structural, intensive care unit culture).[21]

Many nursing interventions are incorporated into care for the immobilized patient, regardless of the underlying condition. Progressive mobility refers to the application of a mobility plan involving a series of gradual interventions and activities that include positioning, turning, continuous lateral rotation therapy (CLRT), range-of-motion exercise, head elevation, tilt table, chair position, dangling, and ambulation. The patient should be positioned with appropriate *body alignment.* This is important to prevent injury to extremities and joints and is critical to prevent pulmonary complications. For example, pillows are commonly used to support the body alignment of a patient placed in a Sims position. The patient should be *repositioned* at least once every 2 hours. Principles of safe patient handling should be applied when patients are moved for repositioning. The patient dependent on caregivers for positioning is at significant risk for skin breakdown because of prolonged pressure over bony prominences. Thus, *skin care* is a priority for immobilized patients; the skin should be kept clean, dry, and protected to prevent pressure injuries. The skin is regularly monitored and examined for evidence of adequate circulation.

Because immobilized patients are at risk for stasis pneumonia, coughing and deep breathing are part of the standard treatment plan. Patients with adequate cognition are encouraged to use an incentive spirometer every hour to maintain ventilator capacity. Rotational bed therapy and CLRT have been shown to reduce the incidence of pneumonia and hospital-acquired pressure injury among patients receiving mechanical ventilation in intensive care settings.[22]

Bed exercises should be encouraged to the extent possible to minimize atrophy and maintain joint movement. Many types of exercise can be done, including flexion and extension of the foot to promote venous blood return and to prevent venous stasis. If a patient has a trapeze bar over the bed, pull-up exercise should be encouraged if he or she is able. Range-of-motion (ROM) exercise is critical to promote circulation and to minimize complications to the joints. Active ROM is performed by the patient; assisted ROM involves a patient doing most of the exercise but under the guidance/assistance of a health professional. Passive ROM involves the nurse taking each affected joint through the full range of motion. It is important not to force the joints past the point of resistance. If tolerated, patients should be encouraged to stand at the side of the bed to promote weight bearing. Doing this a few times a day for a few minutes helps to reduce bone demineralization.

Exercise Therapy

Exercise therapy is a cornerstone intervention in the management of individuals with mobility impairment. The overall goal of exercise therapy is rehabilitative (relieving symptoms and/or improving/restoring ROM, strength, and balance) or preventive. Several forms of exercise therapy exist, including those for ambulation, joint mobility, stretching, and balance. Specific examples of exercise therapy include ROM exercises mentioned previously, stretching, weight lifting, water exercise, and gait training. Specific exercise therapy interventions are planned, structured, and repetitive; these are customized to address the needs of each patient. Exercise therapy is performed by nurses, occupational therapists, and physical therapists in acute care, community-based, and home care settings.

Pharmacologic Agents

Many of the drugs used to treat mobility problems are for the relief of pain or inflammation or to treat underlying conditions. It is beyond the scope of this concept presentation to describe each drug separately, but general categories are briefly presented.

Antiinflammatory agents. Inflammation is a common primary or secondary finding among conditions leading to changes in mobility, from an underlying autoimmune condition to a traumatic injury. Oral antiinflammatory agents, such as corticosteroids and nonsteroidal antiinflammatory drugs (NSAIDs), are by far the most commonly used agents. Corticosteroid injections into a joint space (such as ankle, knee, hip, wrist, elbow, shoulder, and spine) may be effective in reducing inflammation (and subsequently pain) associated with a number of conditions. However, because repeated corticosteroid injections might cause damage to cartilage, the number of injections into a joint is typically limited. Another group of agents used to reduce inflammation are the immunomodulators. These function to weaken or modulate the activity of the immune system, thereby decreasing the inflammatory response.

Analgesics. Although a reduction in inflammation provides some relief of discomfort associated with inflammation, analgesic agents are an important component of drug therapy. Agents that are specifically for analgesia include opioids (e.g., morphine), NSAIDs, and aspirin. Although opioids offer excellent relief in the management of acute pain, there is a high risk for opioid misuse when prescribed for chronic nonmalignant pain.[23]

Muscle relaxants. Several medications are used to provide relief from discomfort associated with skeletal muscle spasms. These agents act as central nervous system depressants and reduce nerve transmission to skeletal muscles, thus promoting muscle relaxation. The most common indication for muscle relaxants is for acute, nonspecific low back pain. Common agents include baclofen, chlorzoxazone, carisoprodol, cyclobenzaprine, dantrolene, and tizanidine.

Supplements. In addition to adequate dietary intake, nutritional supplementation with vitamin D and calcium is a useful prevention and treatment measure for osteoporosis, particularly for postmenopausal women. Bisphosphonates (alendronate, risedronate, ibandronate) are antiresorptive agents that slow or stop the reabsorption of calcium from the bone, resulting in maintained or increased bone density and strength. These agents are used to treat osteoporosis. Anabolic agents (teriparatide, romosozumab) stimulate new bone formation, leading to improvement in bone volume and microstructure. These may be used alone or in combination with bisphosphonates in the treatment of osteoporosis.[24,25]

Surgical Interventions

Many conditions that affect mobility are treated with surgical intervention. Surgical intervention can be either curative or palliative, depending on the underlying cause.[26] Examples of surgical interventions related to mobility/immobility include arthroscopic procedures, open and/or closed reduction of a fracture with or without external and/or internal fixation, amputation, synovectomy, osteotomy, debridement, arthroplasty, arthrodesis, diskectomy, and spinal fusion. Specific details about these procedures can be found in medical–surgical textbooks.

Immobilization

After an injury or surgery, immobilization of a joint or bone is often necessary to provide stability and hold the appendage in place so that healing can occur. After a fracture, for example, bone remodeling takes several weeks before the fracture is stable. Immobilization is necessary to enhance the healing process, to protect the bone from further injury, and to provide comfort to the patient. Common examples of immobile devices include casts, splints, external fixator devices, abductor pillows, shoulder restraints, braces, and traction. Assessment to verify adequate perfusion (the presence of pulse and/or rapid capillary refill in nail beds), movement, and sensation is critical. Another indication for immobilization is to prevent injury. For example, for all patients with suspected spinal injury, spinal immobilization is routinely applied in the prehospital setting by strapping the patient on a backboard and using a cervical collar to prevent head rotation or neck flexion.

Assistive Devices and Patient-Handling Technology

Assistive devices are objects to provide assistance with a task. Many types of assistive devices are commonly used in patient care, including assistive devices for ambulation and for activities of daily living. Common assistive devices to enhance mobility include canes, crutches, walkers, wheelchairs, grabbing/reaching devices, power-operated vehicles, and prostheses.[27] Patients must be taught to use these devices correctly to avoid injury.

Patient-handling technology refers to equipment in the care environment designed to assist with the handling and movement of patients. Examples include transfer mats, slings, and lifts. Education and training on indications and use of these devises, including assessment and decision algorithms for equipment selection, are essential to ensure the safety of the patient and the healthcare providers.

Other Therapies

Transcutaneous electric nerve stimulation. Transcutaneous electric nerve stimulation (TENS) is a therapeutic intervention involving low-voltage electrical current for the relief of pain. Electrodes are placed on the patient's skin near the area of pain; the electrical current creates electrical impulses that travel along the nerve fiber, which is thought to send a signal to the brain that blocks pain signals. TENS is often used for the treatment of joint pain such as osteoarthritis (OA), tendonitis, back pain, and neck pain.

Thermotherapy. Another common collaborative intervention is thermotherapy. Heat therapy involves the application of moist or dry heat (heating pad, warm water bottle, warm bath) to the skin surface. The heat causes a dilation of blood vessels that promotes blood flow and helps to relax muscles that are tight. It is particularly effective for symptomatic relief muscle pain and inflammation (e.g., osteoarthritis, strains, tendonitis, pain or spasms in the back or neck), but is not indicated for a new injury or open wound. Cold therapy involves the application of a cold compress (or immersion in cold water) to an area of inflammation. It causes vasoconstriction of underlying blood vessels to reduce inflammation and is most effective for recent injuries (e.g., a pulled muscle, muscle strain, or sprain). Cold therapy should not be used on an open wound or with vascular disease or injury, and is not generally recommended for low back pain.

INTERRELATED CONCEPTS

Mobility links to numerous concepts. Those considered most important are shown in Fig. 24.3 and discussed further.

Individuals who have inadequate **Gas Exchange** may experience reduced mobility because of excessive fatigue. Immobile patients are at risk of developing complications associated with gas exchange, such as stasis pneumonia as a result of reduced lung expansion. The brain controls movement, coordination, and balance. Thus, optimal mobility is dependent on an intact neurologic system. Individuals who have problems associated with **Intracranial Regulation** may become immobile as a result of unsteadiness, imbalance, or the inability to initiate or execute purposeful movement to the arms, legs, or trunk. Individuals who are immobile may be unable to purchase, prepare, and/or consume adequate **Nutrition**; likewise, individuals with inadequate nutrition may have decreased mobility because of excessive fatigue. Malnutrition can lead to muscle wasting and bone loss. In addition, individuals experiencing extended immobility often experience reduced appetite. **Pain** (acute or chronic) may interfere with mobility. For example, an individual with chronic pain associated with cancer or back pain may experience changes in mobility as a pain management strategy. Likewise, some conditions that are directly associated with immobility (e.g., a fracture) are very painful. Individuals who have impaired **Perfusion** are less able to be mobile because of reduced oxygenated blood reaching peripheral tissues. Among individuals who are immobile, perfusion is less effective because of reduced venous return (which increases the risk for venous clots) and because of extended pressure on tissue. Immobility is a significant risk factor for impaired **Tissue Integrity**. Extended pressure on bony prominences reduces the perfusion of oxygenated blood (especially on the sacrum, hips, elbows, and heel), and skin shearing from movement and transfers may occur, particularly with extended immobility. Individuals who are immobile may have changes to their pattern of **Elimination** or be at risk of experiencing problems such as constipation or urinary retention. This often leads to discomfort and reduced appetite that could negatively affect nutritional intake.

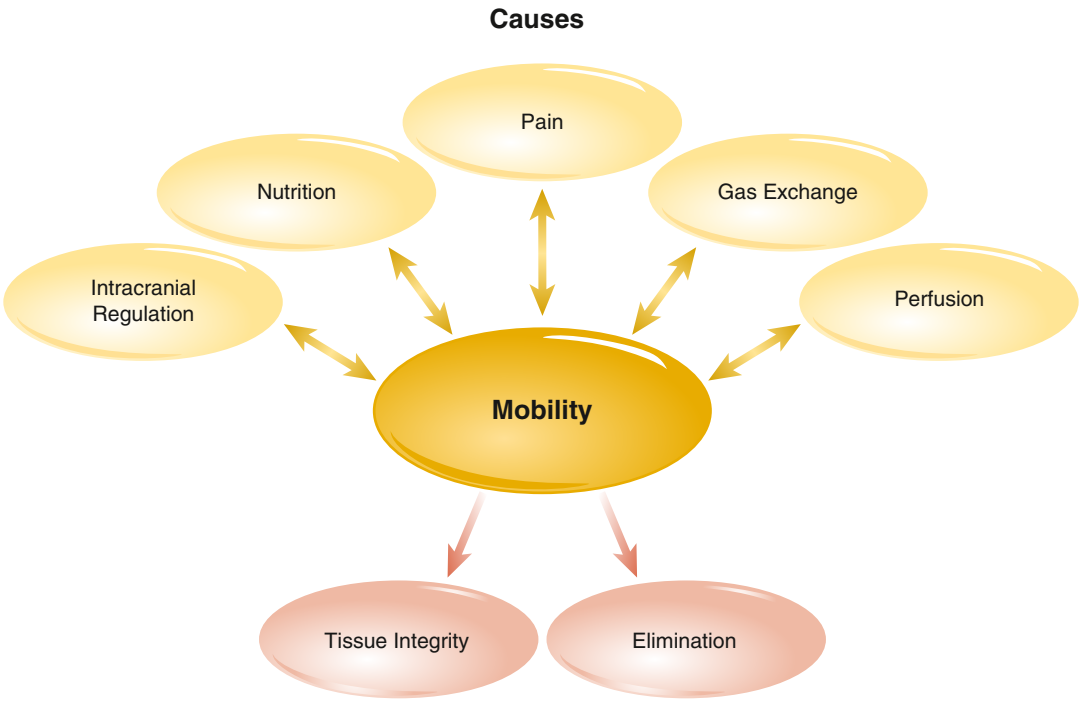


Fig. 24.3 Cause-and-Effect Model: Mobility and Interrelated Concepts.

BOX 24.1 EXEMPLARS OF IMPAIRED MOBILITY

Congenital Defects
- Club foot
- Developmental dysplasia of the hip
- Metatarsus adductus
- Spina bifida
- Syndactyly

Skeletal Conditions
- Amputation
- Fracture
- Fibrosarcoma
- Osteochondroma
- Osteosarcoma
- Osteomalacia
- Osteomyelitis
- Osteoporosis
- Osteogenesis imperfecta
- Rickets

Muscle Conditions
- Disuse atrophy
- Fibromyalgia
- Myotonia
- Myositis
- Rhabdomyoma
- Rhabdomyosarcoma

Back and Spine Conditions
- Spinal cord injury
- Herniated disk
- Intervertebral disk disease
- Low back pain (acute/chronic)
- Scoliosis
- Spinal stenosis

Neuromuscular Dysfunction
- Amyotrophic lateral sclerosis
- Cerebral palsy
- Guillain–Barré syndrome
- Huntington disease
- Multiple sclerosis
- Muscular dystrophy
- Myasthenia gravis
- Parkinson disease

Joint and Connective Tissue Conditions
- Sprains
- Tendonitis
- Joint dislocation
- Osteoarthritis
- Rheumatoid arthritis
- Juvenile idiopathic arthritis
- Gout

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

CLINICAL EXEMPLARS

Many clinical exemplars related to mobility and impaired mobility exist and are seen in all population groups. Featured exemplars provide a brief explanation of classic conditions causing immobility. Detailed explanations and the nursing care for these conditions are presented in medical–surgical, pediatric, and gerontology resources. Box 24.1 presents additional common exemplars across the lifespan.

Featured Exemplars

Osteoarthritis

OA is caused by gradual degenerative changes of the joint (cartilage, joint lining, ligaments, and bone), usually affecting weight-bearing joints (hips, knees, and vertebra) and hands. These changes lead to pain, swelling, and reduced mobility of the joint. It most commonly affects middle-aged and older adults, and typically begins after age 40 years; OA is estimated to affect 33% of adults older than age 65 years.[26]

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a systemic autoimmune condition with genetic predisposition that creates an inflammatory process in the synovial membrane of the joints and other body tissues. Over time, the joint inflammation leads to erosion of the membrane and cartilage, causing pain, swelling, and joint deformity; significant impairment in mobility can result. Affecting less than 1% of the general population, RA is most common among women and individuals older than age 60 years.[28]

Juvenile Idiopathic Arthritis

Juvenile idiopathic arthritis (JIA) represents a group of diseases characterized by chronic inflammation of joints from autoimmune conditions. Depending on severity and duration, JIA can cause significant disability, with joint deformity, mobility impairments, and physical disability. It affects children younger than age 16 years; girls are affected at a rate twice that of boys. It is estimated that 294,000 children under the age of 18 years have JIA; fortunately, many children and adolescents afflicted with this condition often experience remission.[29]

Bone Fracture

Bone fracture refers to a partial or complete disruption in the bone structure. Interruption of bone structure leads to a reduction or loss in movement and pain. Although fractures are usually the result of traumatic injury, spontaneous fractures can occur in the presence of bone disease (e.g., osteoporosis or a neoplasm). Fractures occur at any age, but they are unusual during infancy. Most fractures are seen in children through adolescence, and among older adults. Wrist and hip fractures are particularly common among older adults as a result of falls.

Parkinson Disease

Parkinson disease (PD) is a neurologic disorder associated with a loss of dopamine production in the brain. This disorder leads to changes in mobility resulting from muscular tremor, rigidity of the extremities and trunk, slowness of movement, and impaired coordination and balance. Mobility impairment increases with disease progression. Typically, PD affects adults older than age 50 years, with a higher incidence among men than women.

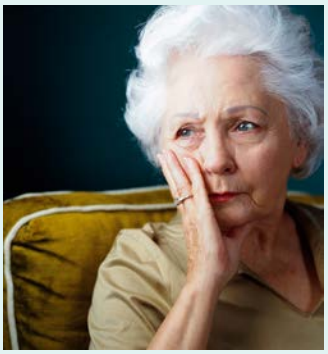
Spinal Cord Injury

Spinal cord injury (SCI) is an injury to the spinal cord that runs through the spinal column. Depending on the degree of injury, SCI may result in temporary or permanent neurologic impairment and mobility. The primary cause of SCI is traumatic injury from motor vehicle accidents, falls, sports, or personal violence. SCI can occur at any age, but the average age of injury is 43 years; since 2015, 78% of SCI cases involved males.[30]

Low Back Pain

Low back pain is one of the most common conditions affecting mobility; nearly all individuals experience low back pain at some point during their life. Back pain generally is caused by muscle, bone, or nerve irritation from a variety of conditions, including muscle strain or spasm, degenerative conditions (e.g., arthritis, stenosis, or intervertebral disc disease), and trauma; it is also a common symptom in late-term pregnancy. Severe back pain can be debilitating and can significantly impair mobility. Back pain can occur in all age groups, but it is most common among adults over the age of 45 years.[31]

CASE STUDY



From Stockbyte/Digital Vision/Thinkstock.

Case Presentation

Mrs. Lydia Martin, an 88-year-old widow, lives alone independently in her single-story home. During the middle of the night, Mrs. Martin fell in her home while walking to the bathroom. Unable to get up, she crawled to reach her phone and dialed 9-1-1. She was transported to the emergency department and underwent diagnostic tests including hip and femur x-ray and computed tomography, which confirmed a left femoral neck fracture. Her past medical history includes anxiety, osteoporosis, arthritis, and cataracts.

Mrs. Martin underwent an open reduction internal fixation procedure. After surgery, she had a compression dressing with ice to the left hip, a Foley catheter, antiembolism stockings, a sequential compression device, and an order to use the incentive spirometer every hour while awake. Her medications included hydrocodone bitartrate 7.5 mg/acetaminophen 750 mg (Vicodin ES) two tabs by mouth every 4 hours as needed for pain and enoxaparin (Lovenox) 40 mg daily subcutaneously.

The day after surgery, the physical therapist began to work with Mrs. Martin; the goal of the session was to get her out of bed to a chair. During the attempted transfer, Mrs. Martin's surgical site was painful, and her Foley catheter was pulled, causing pelvic pain. She screamed in pain and refused to continue the process. Mrs. Martin was anxious and fearful of pain and became worried that she would never walk again and would end up in a nursing home. She was unwilling to move and declined physical therapy over the next 3 days. Mrs. Martin became constipated and lost her appetite. She also developed a stage 2 pressure ulcer over her sacrum. Eventually, on postop day 4, Mrs. Martin agreed to work with the physical therapist. By this time, she experienced significant weakness and fatigue and was unable to move independently. Mrs. Martin was later transferred to a rehabilitation center to continue regaining her mobility.

Case Analysis Questions

1. Did Mrs. Martin have any risk factors prior to her injury? If so, what were they?
2. What complications emerged as a result of Mrs. Martin's immobility?
3. How do the collaborative interventions help improve her mobility?

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CONCEPT 25

Tissue Integrity

Debra A. Hagler

The skin supports critical life functions including management of temperature, conservation of fluid, and protection from infection.[1] Nurses play a pivotal role in helping persons of all ages to maintain healthy skin and tissue. When an individual experiences disruption of tissue integrity, nurses contribute independently and collaboratively to manage the care.

DEFINITION

Tissues are organized groups of cells with common functions. Of the four types of tissues—muscle, neural, connective, and epithelial—the concept of tissue integrity is most closely aligned with epithelial tissue. The term *impaired skin integrity* is specifically focused on damage to the epidermal and dermal layers of epithelial tissue, but deep damage to skin integrity is associated with disruption of underlying tissues. For the purposes of this concept presentation, tissue integrity is defined as *the state of structurally intact and physiologically functioning epithelial tissues, such as the integument (including the skin and subcutaneous tissue) and mucous membranes.*[2,3] The term *impaired tissue integrity* reflects varying levels of damage to one or more groups of epithelial cells.

SCOPE

The concept of Tissue Integrity ranges from an intact state serving as the body's protective barrier to some level of disrupted or impaired surface. Disrupted tissue integrity ranges from superficial or partial-thickness injury of the epidermis to deep or full-thickness injury of the dermis and deeper tissues (Fig. 25.1). Individuals at all points across the life span experience disruptions to tissue integrity.

NORMAL PHYSIOLOGICAL PROCESS

The skin is the largest organ of the body. Epithelial cells join to cover nearly every internal and external surface of the body, providing protection from the external environment, absorption of needed substances, secretion into body cavities, and excretion of wastes. The skin, as an external surface, protects other tissues and organs from mechanical trauma, fluid loss, chemical disruption, and infectious organisms. The nerves in the skin layer provide a safety mechanism as sensations of pain, temperature, and touch inform a person about the environment and reveal the need to take actions that prevent or limit damage to the body. The integument is made up of the two layers commonly known as skin—the epidermis and the dermis—and the underlying subcutaneous or fat tissue (Fig. 25.2). Sweat glands and the small muscles in the dermal layer that control piloerection (goosebumps) help maintain body temperature within a fairly narrow range despite air temperature changes. Subcutaneous tissue, under the dermal layer, contains fat cells and additional sweat glands that assist in temperature regulation.

Mucous membranes are epithelial tissues continuous with the skin that line the eyelids, nose and mouth, ears, genital area, urethra, and anus. Some mucous membranes secrete thick, slippery mucus that helps to protect the body from infection.[1]

Age-Related Differences

Infants, Children, and Adolescents

Skin texture and function change over the course of the life span. Infants' thinner, more permeable skin has less subcutaneous fat than older children and adults, which leads to a greater potential for fluid loss and ineffective temperature regulation. The skin texture of infants and young children is smooth and dry. Apocrine glands are nonfunctional until puberty. Adolescents experience increased apocrine sweat glands and sebaceous gland activity, resulting in more oily skin and acne.[4]

Fig. 25.1 Scope of Concept: Tissue Integrity. Tissue integrity ranges from intact skin to partial-thickness injury and full-thickness injury.

Older Adults

Several changes to the skin occur as a result of the aging process. The skin becomes thin, with less strength, moisture, and elasticity. A decrease in underlying supportive structures such as lean muscle mass and subcutaneous fat often results in skin wrinkling or hanging loosely. A diminished perception of pain may prevent early recognition of injury, while reduced arterial and venous blood flow to the tissues make skin more prone to injury and delay wound healing. In addition, the growth of hair and nails slows with aging, and a decrease in sebaceous gland activity can result in rough, dry, itchy skin.[4] The aging process of skin is partly influenced by genetics and race, but it is also largely associated with environmental exposure—particularly to sun and wind.[1]

VARIATIONS AND CONTEXT

Six major categories of impaired tissue integrity are trauma/injury, loss of perfusion, immunologic reaction, infections and infestations, thermal or radiation injury, and lesions. Within each of these categories, partial- or full-thickness tissue injury can occur.

Trauma/Injury

Tissue trauma or injury includes intentional and unintentional damage ranging from a superficial abrasion or scrape to a deep wound penetrating the skin and subcutaneous layers, with extension to muscle, internal organs, and bone. In areas with little or no subcutaneous tissue (e.g., the back of the hand, top of the foot, or skull), a relatively minor blunt or penetrating injury may extend through the skin layers to the muscle or bone. A surgical incision is an example of an intentional injury to the skin, inflicted to reach deeper structures for a therapeutic purpose.

Loss of Perfusion

All tissue requires a continuous supply of oxygenated blood. The skin is relatively tolerant of poor circulation compared with other organs; in times of shock, it even survives a temporary shunting of oxygenated blood away from the skin to protect the perfusion of other organs, such as the heart and brain. However, prolonged poor perfusion or a shorter period of no perfusion can lead to tissue necrosis. Examples of impaired tissue integrity from chronic poor perfusion include ulcerations, necrosis, and loss of digits. Examples of short-term or temporary disruption of perfusion to tissue caused by unrelieved pressure are pressure ulcers/pressure injuries. Tissue damage may be caused by a number of factors, including loss of perfusion caused by excessive pressure, but a dermal ulcer is not necessarily caused by pressure alone.[5]

Immunologic Reaction

Skin redness, rash, or hives are common signs of an allergic response. Substances that often lead to skin irritation and/or local allergic response are soaps, detergents, cleaning products, fragrances, and metals such as nickel, silver, and copper.[1] In

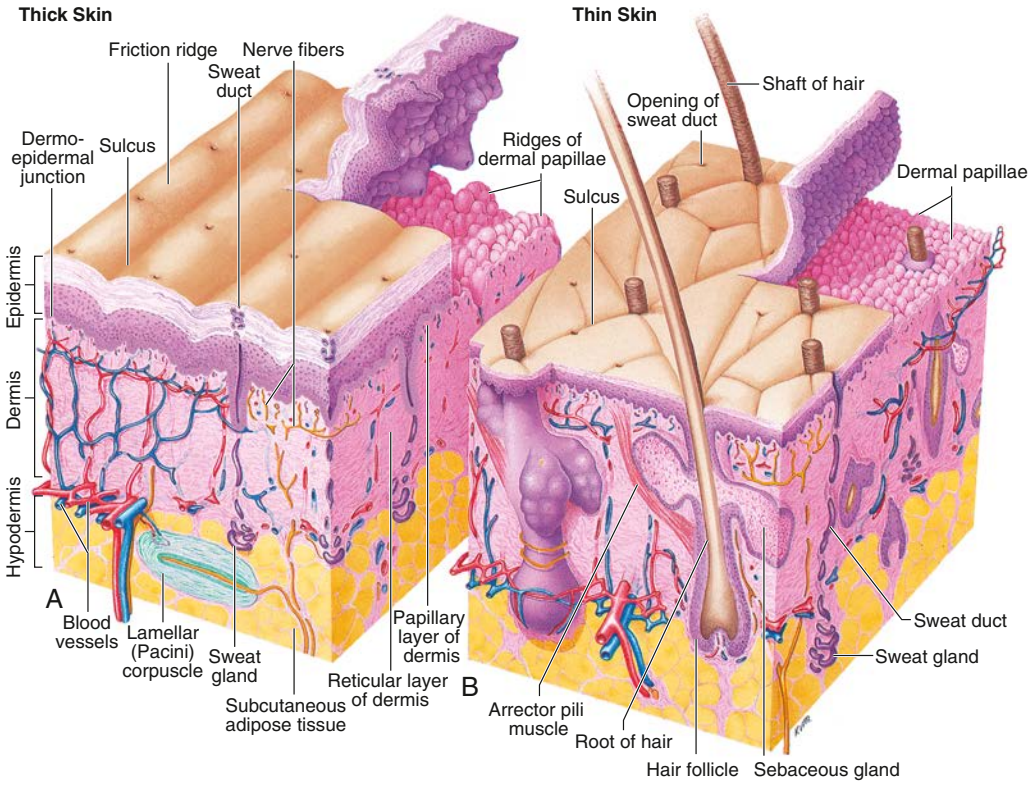

Fig. 25.2 Diagram of Skin Structure. (A) Thick skin, found on surfaces of the palms and soles of the feet. (B) Thin skin, found on most surface areas of the body. In each diagram, the epidermis is raised at one corner to reveal the papillae of the dermis. (From Patton, K. T., & Thibodeau, G. A. [2016]. *Anatomy and physiology* [9th ed.]. St. Louis: Mosby.)

addition, skin disruptions such as psoriasis are chronic inflammatory immune responses. In rare cases, a hypersensitivity response to a medication can cause extensive tissue sloughing. Severe hypersensitivity disorders such as Stevens-Johnson syndrome or toxic epidermal necrolysis involve large areas of epidermal tissue sloughing with a high risk for life-threatening fluid loss, hypothermia, and infection.[1]

Infections and Infestations

Acute skin infections are among the most common dermatologic conditions seen during emergency department visits in the United States. Skin and mucous membrane infections can be the result of bacteria, fungi, or viruses. Live arthropods can cause tissue disruption by burrowing under the skin or attaching to skin structures such as hair shafts. Tissue damage from infestation and the resulting scratching behavior increase the risk of secondary infection.

Bacterial Infection

Bacteria that are normally present on the skin generally cause no harm, but pathogenic bacteria can cause superficial or deep infection. A small abrasion or lesion can provide a portal for opportunistic or pathogenic infectious organisms to infect deeper tissues. Superficial skin infections involve only the dermis, but deeper bacterial infection causes cellulitis, an inflammation of the subcutaneous tissues and potentially also muscle tissues. Impetigo, caused by staphylococci or β-hemolytic streptococci, is the most common superficial bacterial infection, and it spreads easily among small children on contact. A common bacterial infection of the skin seen in adolescents is acne vulgaris.

Fungal Infections

The fungi that cause superficial fungal infections live on the dead skin cells of the epidermis. *Candida albicans* and other *Candida* species thrive in warm, moist areas of the skin and mucous membranes, particularly the mouth, vagina, and skin folds. In the absence of the bacterial protection of normal flora on the skin or mucous membranes, *Candida* grow more readily. It is common for a person to experience a fungal infection with *Candida* after a course of antibiotics for a bacterial infection has decreased the normal protective flora and allowed *Candida* to flourish. *Tinea* refers to a group of diseases caused by a fungus; these conditions vary with skin sites and the types of fungal species, such as tinea capitis on the head and tinea pedis (athlete's foot) on the feet.[1]

Viral Infections

Several viruses cause disruptions in skin integrity. A common form of skin virus is the verruca, or wart. Although warts most commonly occur on the skin of the hands and feet, they can also be found on the genitalia. Herpes simplex virus (HSV) can infect the skin and mucous membranes; HSV type 1 (HSV-1) is more common on the face and mouth, whereas HSV-2 is more common on the genital mucosa.[1]

Infestations

The skin can be infested with live arthropods such as mites and lice. The scabies mite burrows into the epidermis and lays eggs. Mites are transmitted person-to-person or through infested sheets or clothing, where they can live for up to 2 days. Lice most commonly infect the body, head, or pubic hair. Lice lay eggs along the hair shafts and are transmitted by personal contact, clothing and bedding, and shared hair care items or hats.[1]

Thermal or Radiation Injury

Thermal and radiation injuries to the skin range from the common sunburn to extensive scald burns and radiation burns. Sunburn appears after the epidermis has been exposed to excessive ultraviolet (UV) radiation. It appears as redness and inflammation and may extend to blistering—with chills, fever, and pain—followed by peeling skin. Burns resulting from a scald with hot liquids or contact with flame and/or heated items cause a series of chemical and mechanical events at the tissue level. Radiation therapy, used to treat some forms of cancer, requires careful monitoring and skin care to prevent burns.

The initial tissue response to burns is inflammation and vasoconstriction; edema at the site of a burn can last for several days. Later, fibroblasts produce the proteins collagen and elastin, which restore some structure and elasticity to the wound. Macrophages remove bacteria and foreign substances to clean the wound. New vascular networks form, and new epithelial cells grow and cover the open area from the burn wound edges to the center as the wound begins to contract.[6]

Lesions

Lesions can range from benign skin growths and vascular lesions to invasive malignant tumors. The most common types of skin cancers are melanoma, basal cell carcinoma, and squamous cell carcinoma.[7] Even benign skin growths may be of concern if they cause pressure on or displacement of other structures or change the person's appearance in a distressing way.

Expected Physiologic Process for Wound Healing

Tissue injuries and wounds heal by processes of primary, secondary, or tertiary intention. Healing by primary intention occurs when wound margins are well approximated, as in a sutured surgical incision or a simple laceration; it takes place more rapidly than the other types of healing. Healing by secondary intention occurs when wounds such as ulcerations have distant edges and granulation tissue gradually fills the gap to close the wound. Healing by tertiary intention occurs when a wound is sutured closed much later, resulting in more scarring than that which occurs for wounds closed with primary intention. Tertiary closure is used when a wound must stay open until infection or wound contamination is resolved; later, the clean wound is sutured to facilitate continued healing.

There are three phases of wound healing: inflammatory, granulation, and maturation. The inflammatory phase lasts 3 to 5 days, while blood clots form at the site of injury and platelets release growth factors to begin the healing process. A matrix of cells and debris forms at the site and is later removed by macrophages. During the granulation phase, new vessels and collagen structures are formed, resulting in a very vascular pink wound. White blood cells continue to remove debris, while the epithelium begins to grow from the edges toward the center of the

wound. The maturation phase of collagen fiber remodeling and scar contraction may continue for months or years.[6]

CONSEQUENCES

Impaired tissue integrity may affect thermoregulation, elimination, fluid and electrolyte balance, protection from infection, safety, comfort/pain, and body image. The skin normally regulates body temperature within a narrow range through the constriction or relaxation of piloerector muscles, vasodilation or vasoconstriction of vessels in the dermis, and the production of sweat. In the absence of intact skin and underlying tissue, such as an overwhelmingly burned surface, the ability to regulate body heat and prevent excess fluid loss is impaired, requiring external maintenance of temperature and massive fluid replacement. Whether the skin is disrupted by a small abrasion or a massive wound, that loss of the skin barrier means that underlying structures are not protected from the environment's infectious and chemical dangers. Even a small open wound can provide a portal for infection if the person is immunocompromised or the infectious agent is particularly virulent. Damage to nerve endings prevents the normal sensation that provides cues about the environment and helps promote safety during movement. Because the skin has many sensory nerve endings, particularly over the hands and face, injuries and lesions can be painful. Skin conditions are often highly visible to the individual and others, potentially affecting body image and provoking psychological distress about one's physical appearance.[6]

RISK FACTORS

Age-Related Risks

Some risk factors for skin disruptions are related to age or developmental level. For example, diaper rash is a common rash among infants and toddlers; likewise, this age group is at risk for injuries to the skin and mucosa secondary to uncertain mobilization, the affinity for placing various objects in the mouth, and the inability to protect oneself from environmental dangers. Communicable skin infections such as impetigo are more commonly transmitted where there is frequent skin-to-skin contact, as in child care centers or on playgrounds. School-age children may experience frequent minor tissue injuries such as abrasions, bruises, and small lacerations that can occur during active play. Burns are among the most common types of injuries in children.[8]

The changes to skin associated with aging are actually a result of sun and environmental damage over a long period of time, leading to a wrinkled and leathery appearance. Exposure of the skin to sun over an extended period of years increases the risk of skin cancers.[7] Older adults are also more prone to skin tears that can occur with minimal contact or pressure as a result of the skin's thin, fragile texture.[4]

Individual Risk Factors

Many individual risk factors for tissue disruption are associated with underlying health conditions. Health conditions associated with poor peripheral perfusion, malnutrition, obesity, fluid deficit or excess, impaired physical mobility, and immunosuppression increase the risk of tissue disruption. In addition, exposure to chemical irritants, radiation, excessively hot or cold temperatures, and mechanical damage may cause a loss of tissue integrity. Individuals who have undergone medical treatments, surgical procedures, or invasive procedures have disruptions to skin and tissue integrity as a result of those procedures.

Genetics

A number of inherited skin disorders are associated with an underlying metabolic condition or a chronic condition that affects many body systems. Examples of inheritable skin conditions include ichthyosis vulgaris, xeroderma pigmentosa, albinism, epidermolysis, ectodermal dysplasia, and incontinentia pigmenti.

Skin Cancer Risk

Basal cell skin cancer usually occurs in areas that have been exposed to the sun, such as the face, and is the most common skin cancer in light-skinned persons. Squamous cell skin cancer is usually found in areas less exposed to the sun, such as the legs or feet, and is the most common type of skin cancer in dark-skinned persons. Melanoma is a virulent and potentially life-threatening form of skin cancer that has a good prognosis if detected early. It begins in the pigment cells or melanocytes, can grow on any skin surface, and is found most commonly in men on the head, neck, and torso. In women, melanoma is more commonly found on the torso or the lower legs. Although rare in people with dark skin, when it does develop, melanoma is found under the nails and on the palms and soles. Fair-skinned men and women older than 65 years of age, persons with atypical moles, and those with more than 50 moles are at substantially increased risk for melanoma. Other risk factors for skin cancer include family history and a considerable history of sun exposure and sunburns.[9]

Pressure Injury Risk

A pressure injury is defined as "*localized damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear.*"[10] Risk factors for dermal ulcers include impaired cognition or sensory perception, immobility, friction and shearing, poor nutrition, impaired perfusion or oxygenation, impaired sensation, incontinence, and/or moisture.[5] Certain medical conditions are also associated with increased risk (Box 25.1).

ASSESSMENT

Assessment of the skin involves taking a history, conducting a skin examination, and performing diagnostic testing.

History

The health history begins with questions related to past and current conditions, medications, known allergies, and family

BOX 25.1 Common Conditions Associated With Pressure Injury or Dermal Ulcer Development

- Spinal cord injury
- Stroke or traumatic brain injury
- Musculoskeletal trauma/fracture
- Neuromuscular disorders
- Rheumatoid arthritis
- Alzheimer disease
- Heart failure
- Peripheral artery disease
- Chronic obstructive pulmonary disease
- Diabetes (types 1 and 2)

BOX 25.2 Health History Related to Tissue Integrity

- Previous history of skin disease
- Change in pigmentation
- Change in mole
- Change in nails
- Hair loss
- Excessive dryness or moisture
- Pruritus
- Excessive bruising
- Rash or lesion
- Self-care behaviors
- Medications
- Environmental or occupational hazards

From Jarvis, C. L. (2020). *Physical examination and health assessment* (8th ed.). Philadelphia: Saunders.

history. Medications may cause rashes through an allergic reaction, a side effect, or by inducing hypersensitivity to sunlight. Box 25.2 lists specific information about tissue integrity to discuss during the health history.

Examination Findings

Inspection

Examination of the skin starts with inspection, which includes color and the presence of lesions. Normal adult skin is a consistent color, ranging from light pink to olive tones and deep brown, with relatively darker shades in areas of sun exposure. Oral and eye mucosa may appear pale pink to darker pink, red, or brown. Skin findings may vary by natural skin color; for example, cyanosis may appear as a blue-gray color in light-skinned persons or ashen gray color in dark-skinned persons. The more visible areas for identifying generalized changes in skin color for a dark-skinned person are those with the least pigmentation, particularly the subglossal mucosa, the buccal mucosa, the palpebral conjunctiva, and sclera.[4]

A bright light, a ruler, and a magnifying glass are helpful tools for skin inspection. Describe the location, size, shape, color, elevation, consistency, and pattern of lesions. Also, describe the grouping of multiple lesions in rings, lines, or diffusely scattered arrangements and the color, odor, and consistency of any exudates.[4]

Palpation

The skin should be smooth and intact, with an even surface and minimal perspiration or oiliness except after exercise or heat exposure. There should be no dryness, peeling, or cracking, although there may be calluses over the hands, feet, elbows, and knees. Skin folds should not be excessively moist or macerated. Skin mobility and turgor are assessed by picking up and slightly pinching the skin on the forearm or under the clavicle. The skin should move easily when lifted and should return to place immediately when released. Checking for skin turgor using the older adult's hand may give a false impression of dehydration, so turgor should be checked in the forearm or under the clavicle. The loss of subcutaneous tissue in the hands with aging causes an appearance of skin tenting even when hydration is normal.[4]

Wound Assessment

Wounds may result from direct or indirect tissue injury. Assess the wound location, size, shape, and color as well as the color, odor, and consistency of any drainage or exudate. Redness of the surrounding tissue, foul odor, or purulent drainage may indicate wound infection.

A surgical wound may be left open to the air or covered with a dressing to protect the wound site and absorb drainage. Covered wounds should be carefully assessed when the wound is exposed during dressing changes. Describe the amount and character of any wound drainage.[6]

Pressure injuries, a specific type of wound, are assessed for size and depth, as well as for level of tissue injury. Pressure injuries are classified by four stages, presented in Box 25.3. When the wound is covered with eschar—a dry scab covering—it is not possible to determine the stage of the wound. The eschar may have to be removed through pharmacologic, mechanical, or surgical debridement to allow for the wound's accurate assessment and promote healing.[5]

Diagnostic Tests

Only a few common diagnostic tests are linked to the concept of tissue integrity.

- *Patch testing:* This is a test used to identify specific allergens causing contact dermatitis. One or many potential allergens can be tested simultaneously by applying a small amount of the substance to a marked area of the skin, usually on the back.
- *Wound culture:* A wound culture identifies the organism(s) causing infection. Because some bacteria are present on healthy skin, normal skin flora may be identified in wound cultures along with any pathogenic bacteria.
- *Tissue biopsy:* Various types of biopsies—such as punch, incision, excision, and shave—are conducted for pathologic evaluation of tissue when skin lesions are suspected to be malignant. The type and depth of biopsy are based on the lesion and the location.
- *Woods lamp:* Use of a Woods lamp (black light) or immunofluorescence enhances inspection with magnification and special lighting. It is used to identify the presence of infectious organisms and proteins.[6]

BOX 25.3 Pressure Injury Stages From the National Pressure Ulcer Advisory Panel

Stage 1: Nonblanchable Erythema
Intact skin with a localized area of nonblanchable erythema, which may appear differently in darkly pigmented skin. Presence of blanchable erythema or changes in sensation, temperature, or firmness may precede visual changes. Color changes do not include purple or maroon discoloration; these may indicate deep tissue pressure injury (DTPI).

Stage 2: Partial Thickness
Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister. Adipose (fat) is not visible and deeper tissue is not visible. Granulation tissue, slough, and eschar are not present. These injuries commonly result from adverse microclimate and shear in the skin over the pelvis and shear in the heel.

Stage 3: Full-thickness Skin Loss
Full-thickness skin loss in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) is often present. Slough and/or eschar may be visible. The depth of tissue damage varies by anatomic location; areas of significant adiposity can develop deep wounds. Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage, or bone is not exposed. If slough or eschar obscures the extent of tissue loss, this is an unstageable pressure injury.

Stage 4: Full-thickness Tissue Loss
Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage, or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining, and/or tunneling often occur. Depth varies by anatomic location. If slough or eschar obscures the extent of tissue loss, this is an unstageable pressure injury.

Unstageable Pressure Injury: Obscured full-thickness skin and tissue loss
Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a stage 3 or 4 pressure injury will be revealed. Stable eschar (i.e., dry, adherent, intact, without erythema or fluctuance) on ischemic limb or heels should not be softened or removed.

Deep Tissue Pressure Injury (DTPI): Persistent nonblanchable deep red, maroon, or purple discoloration
Intact or nonintact skin with localized area of persistent nonblanchable deep red, maroon, and/or purple discoloration or epidermal separation revealing a dark wound bed or blood-filled blister. Pain and temperature change often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. The wound may evolve rapidly to reveal the actual extent of tissue injury or may resolve without tissue loss. If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle, or other underlying structures are visible, this indicates a full-thickness pressure injury (unstageable, stage 3 or 4). Do not use DTPI to describe vascular, traumatic, neuropathic, or dermatologic conditions.

From National Pressure Ulcer Advisory Panel. (2016). *NPUAP Pressure Injury Stages*. Copyright NPUAP, used with permission. Retrieved from http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-injury-stages/

CORE COMPETENCIES

Tissue Integrity

- Integrate evidence-based knowledge from nursing and other sciences as it relates to tissue integrity.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to tissue integrity.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to tissue integrity for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to tissue integrity.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to tissue integrity.
- Demonstrate clinical judgment founded on broad knowledge of tissue integrity.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention measures guard against the development of disease. Primary measures to prevent disrupted tissue integrity include hygiene, nutrition, and protection from excessive sun exposure or other environmental hazards.

General Skin Hygiene

Basic skin hygiene prevents many common skin irritations and infections. Infants and toddlers need frequent cleansing of the hands and face to remove food residue and frequent perineal care to prevent irritation from urine and stool. During adolescence, sebaceous and sweat glands become more active; therefore, more frequent bathing becomes necessary to reduce body odors and oils. In older adults, sebaceous and sweat glands become less active again and skin loses some of its moisture and elasticity. Older adults may find that a complete daily bath with soap can cause excessively dry skin; therefore, they may prefer to bathe less frequently and use a gentle moisturizing cleanser.

Hygiene practices are often linked to cultural norms and rituals. Although in North America it is common to bathe or shower daily and to use deodorant, cultural preferences may include bathing less frequently or not bathing at all during illness or after childbirth.[11]

Nutrition

Adequate protein, calories, minerals, vitamins, and hydration are needed for maintenance of healthy skin. In the chronic absence of adequate nutrition, skin becomes dry and flaky, hair appears dull, and subcutaneous fat disappears. Even a short period of poor nutrition, such as being unable to eat before and after surgery, can damage tissue integrity and delay wound healing.[6]

Sun Exposure

Box 25.4 lists National Cancer Institute recommendations for skin cancer prevention through protection from sun exposure.

BOX 25.4 Recommendations for Protection From Sun Exposure

Skin experts suggest the following:

- Use sunscreen that protects against UV radiation.
- Do not stay out in the sun for long periods of time, especially when the sun is at its strongest.
- Wear long sleeve shirts, long pants, sun hats, and sunglasses when outdoors.

From National Cancer Institute. (2021). *Skin Cancer Prevention (PDQ®)—Patient Version*. Bethesda, MD: National Institutes of Health. Retrieved from https://www.cancer.gov/types/skin/patient/skin-prevention-pdq#section/_16.

Population-based interventions designed to increase sun-protective behaviors in recreational settings include offering culturally relevant educational materials and reminders at the entrances to the setting; providing sun-safety training for—and role modeling by—lifeguards, aquatic instructors, recreation staff, parents, and children; increasing the availability of shaded areas; and having sunscreen readily available.[12]

Burn Prevention

Hot-water temperature in the home should be set at a maximum of 120°F to avoid scald burns. Smoke alarms should be installed and maintained. Electrical cords should be inspected regularly, and frayed cords should not be plugged in.

Infants and toddlers are at particular risk for burns. Advise parents not to carry an infant and hot liquids or foods at the same time. Milk and formula should not be heated in the microwave oven because the uneven temperatures can scald the infant's mouth. Young children should be kept away from hot oven doors, irons, wall heaters and grills, electrical cords, and cups or dishes of hot food. Older children should be taught stovetop and microwave oven safety.[13] Those with decreased temperature sensation, such as the elderly and individuals with peripheral neuropathy, should test bath water with a thermometer before stepping in.

Pressure Injury and Dermal Ulcer Prevention

Prevention of pressure injuries and dermal ulcers requires an initial assessment and daily reevaluation and documentation for inpatients at risk of ulcer development using a tool such as the Braden Scale for Predicting Pressure Sore Risk.[14] The Braden scale consists of six subscales based on common causes of dermal ulcers: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Adults scoring less than 18 of 23 possible points on the Braden scale are considered at risk for dermal ulcers. The scale is often completed as part of a healthcare facility's admission assessment and periodic reassessment. Persons found to be at higher risk should have more intensive preventive measures instituted. Those at risk in the home setting can assess their own skin with the assistance of family members or caregivers. Preventive interventions include minimizing or eliminating friction and shear (e.g., sliding on sheets), minimizing pressure through frequent repositioning and use of pressure-relieving devices, managing moisture on skin surfaces, and maintaining adequate nutrition and hydration.[5]

Secondary Prevention (Screening)

Malignant melanoma is a particularly virulent type of skin cancer, but early detection and treatment improves the outcome. The United States Task Force for Preventative Services (USTFPS) has concluded that there is insufficient evidence to recommend skin cancer screening among asymptomatic adolescents and adults by a clinician.[15] A key point to this recommendation is "asymptomatic" adults. Thus, individuals who notice new lesions or changes in existing lesions are urged to have these evaluated. Skin self-assessment is an effective strategy for early identification of potentially cancerous lesions. The mnemonic ABCDE can be used to remember the early signs of melanoma during a skin assessment; it can also be taught to patients to guide their own comprehensive monthly skin self-assessments:[7]

- ***A**symmetry:* The shape of one half does not match that of the other half.
- ***B**order* that is irregular: The edges are often ragged, notched, or blurred in outline. The pigment may spread into the surrounding skin.
- ***C**olor* that is uneven: Shades of black, brown, and tan may be present. Areas of white, gray, red, pink, or blue may also be seen.
- ***D**iameter:* There is a change in size, usually an increase. Melanomas can be tiny, but most are larger than the size of a pea (larger than 6 mm or approximately ¼ in.).
- ***E**volving:* The mole has changed during the past few weeks or months.

CLINICAL NURSING SKILLS FOR TISSUE INTEGRITY

- Assessment
- Skin hygiene
- Wound care
- Medication administration
- Patient teaching

Collaborative Interventions

Pharmacotherapy

Medications for skin disorders include topical and oral or parenteral antibiotics, steroids, topical moisturizers, and anticancer agents or immunosuppressive chemotherapy.

Antibiotics. Antibiotics are used to treat infections and can be administered via oral, intravenous, or topical routes. Common fungal infections such as athlete's foot may be treated with over-the-counter antifungal creams or sprays. When arthropod infestations appear in the skin, an antibiotic is commonly administered in shampoo or lotion form and applied to the affected area.

Steroids. Topical steroids are often used to treat allergic dermatitis and the irritating symptom of pruritus (itching). Oral or parenteral steroids may be used when urticaria (hives) manifests on the skin, indicating a systemic allergic reaction.

Emollients. Lotions, creams, and ointments may be used to retain moisture in the skin or as a base for other medications. Gels and powders are used when excessive moisture is present.

Chemotherapy agents. Immunosuppressive agents are used for chronic inflammatory disorders such as psoriasis.[16] When skin lesions are malignant, cancer chemotherapy and systemic adjunct therapy may be used.[7]

Wound Care

Cleansing. The goal of wound cleansing is to promote wound healing by removing debris and excessive exudates. Shallow wounds that appear healthy are generally cleaned with mild soap and water, and deeper but healthy wounds are cleaned gently with normal saline. Harsh solutions such as diluted bleach, acetic acid, or hydrogen peroxide can break down the cell walls of the newly formed tissues, so those solutions are reserved for use in heavily contaminated wounds.

Dressings. Wounds may be mechanically protected to promote healing in a moist but not soggy environment using a simple adhesive bandage or more complex dressings. Dry dressings are used to absorb excessive exudates, whereas moist dressings are used to maintain a slightly damp environment to promote tissue repair. Nonadherent dressings are useful when the wound drainage is slight and may dry between dressing changes, causing the dressing to stick to the fragile wound surface and, thus, disrupt the wound during dressing removal. Occlusive and semiocclusive dressings are used for clean wounds that have minimal drainage but need to be protected from environmental pathogens, such as a central intravenous catheter puncture site. Hydrocolloid, hydrogel, and alginate dressings are used to absorb exudates while maintaining a therapeutically moist wound surface to promote healing. Vacuum-assisted closure systems are special dressings for complex wounds attached to a device that maintains negative pressure at the wound surface, aiding in removal of large amounts of exudates.[6]

Phototherapy

Some skin disorders, such as psoriasis and atopic dermatitis, respond to controlled phototherapy with UV light. Protection from excessive UV exposure during phototherapy is important to prevent tissue damage.[16]

Surgical Treatment

Excisions—scalpel or laser. Surgical removal is indicated for benign lesions such as deep plantar surface warts unresponsive to other therapy and malignant lesions such as squamous, basal cell, and melanoma skin cancers. Surgical excision of primary melanoma includes removal of the lesion and an additional margin around the lesion to ensure the eradication of malignant cells.[7]

Debridement. Wounds covered with a dry, leathery eschar may not heal until the eschar has been removed. Surgical debridement enables rapid removal of the eschar and debris, whereas debridement using topical collagenase or wet-to-dry dressings is done slowly over a longer period of time. Collagenase ointment breaks down the peptide bonds in necrotic ulcers or burn wound tissues without damaging the healthy tissue.[6]

Skin grafts. When extensive damage is associated with large or deep burns, wound excision and skin grafting are required to cover and heal the wounds. Grafts may be taken from other areas of the person's skin or from living or nonliving donors; porcine grafts may also be used. In addition to grafts, skin substitutes and bioengineered skin coverings are available.[6]

Nutrition

Tissue maintenance and repair is dependent on adequate nutrition. Protein and vitamins A and C are particularly critical for collagen synthesis in wound healing. In the absence of adequate nutrition, wound healing is delayed and infection is more likely. Early enteral or parenteral nutrition is important to consider for patients at risk.[6]

INTERRELATED CONCEPTS

Multiple concepts have a close interrelationship with tissue integrity. Adequate **Perfusion** with oxygen- and nutrient-enriched blood (**Gas Exchange**) promotes tissue integrity; in the absence of oxygen or sufficient **Nutrition**, the tissues can be suffocated and/or starved, leading to atrophy or necrosis. Adequate **Sensory Perception** and **Mobility** provide the stimulus and action needed to prevent prolonged pressure from limiting the perfusion to a specific tissue area. The nerves of the skin provide feedback about temperature and pressure that serve as a safety mechanism for the person negotiating the environment. Unrelieved pressure on body tissue eventually causes injury.

In the presence of tissue integrity, the skin functions to maintain balance of **Fluid and Electrolytes** and has a role in **Thermoregulation**. Production of sweat, which includes both water and electrolytes, serves to cool the excessive body temperatures that could lead to organ damage, and it also serves to remove wastes. Altered **Elimination** through urinary or bowel incontinence can also contribute to impairment of tissue integrity through skin contact with caustic excretions. Tissue injury often results in **Pain** because the skin is laden with sensory nerve endings reactive to the irritation of the local damage. The skin and mucous membranes provide a barrier to most organisms and many toxic substances in the environment. A break in the barrier that is provided by intact skin and mucous membranes provides a portal for **Infection** with environmental organisms. These interrelationships are depicted in Fig. 25.3.

CLINICAL EXEMPLARS

There are many clinical exemplars related to tissue integrity. Box 25.5 presents common clinical conditions associated with tissue integrity impairment by categories noted previously: trauma/injury, loss of perfusion, immunologic conditions, infections, thermal/radiation injuries, and lesions. In this section, several exemplars are featured because of their importance or frequency seen in practice. Also, a case study is presented illustrating the concept in a specific clinical context.

Featured Exemplars

The following featured exemplars provide a brief explanation of common conditions causing impaired tissue integrity. For detailed explanations and suggested nursing care for these conditions, consult specific medical-surgical, pediatric, and gerontology resources.

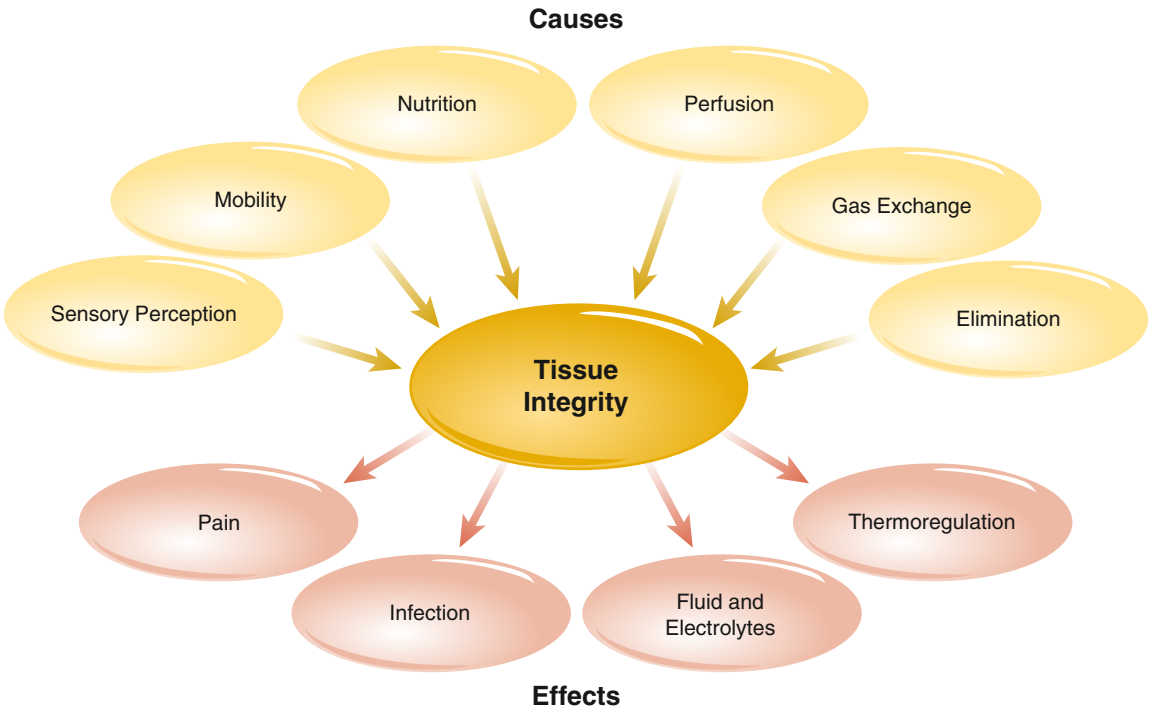

Fig. 25.3 Tissue Integrity and Interrelated Concepts. This is a cause-and-effect model showing the concepts that affect tissue integrity and those concepts that are negatively affected when tissue integrity is disrupted.

BOX 25.5 EXEMPLARS OF IMPAIRED TISSUE INTEGRITY

Trauma/Injury
- Abrasion
- Blister
- Chemical irritant
- Ecchymosis
- Hematoma
- Laceration
- Surgical incision

Loss of Perfusion
- Dermal ulcer
- Pressure injury
- Diabetic foot ulcer

Immunologic Disorders
- Atopic dermatitis
- Psoriasis
- Scleroderma
- Stevens-Johnson syndrome
- Systemic lupus erythematosus
- Toxic epidermal necrolysis

Bacterial Infection
- Cellulitis
- Impetigo

Fungal Infection
- Tinea pedis (athlete's foot)
- Vaginitis

Viral Infection
- HSV-1 (usually oropharyngeal)
- HSV-2 (usually genital)
- SARS-COVID-19 (rash, toes with discolored lesions)
- Verruca (warts)

Infestations
- Lice
- Scabies

Thermal/Radiation
- Burns
- Frostbite
- Radiation burns
- Sunburn

Lesions
- Basal cell carcinoma
- Benign tumors
- Malignant melanoma
- Squamous cell carcinoma

HSV, Herpes simplex virus.

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Abrasion/Laceration

Abrasions and lacerations are superficial traumatic injuries to the epidermis, dermis, and subcutaneous layers or to mucous membranes. Superficial injuries to highly vascular areas such as the scalp and oral mucosa may bleed extensively. The major risk of epidermal and dermal injury is the loss of a protective barrier, increasing the possibility of infection by contact with pathogens.

Pressure Injury/Pressure Ulcer

Unrelieved pressure can disrupt perfusion and oxygenation to tissue cells, leading to tissue necrosis of varying depths from superficial to bone-deep. Individuals who have decreased sensation or mobility are at greater risk for pressure injuries. Recognizing risk factors (see Box 25.1) and implementing prevention strategies are critical to reduce the prevalence of pressure injuries.[5] Prolonged skin contact with or pressure from rigid medical equipment such as oxygen delivery devices, feeding tubes, casts, or bedpans may also result in tissue injury.

Psoriasis

Psoriasis is a recurrent inflammatory skin disease that affects more than 7.5 million U.S. adults.[16] Individuals most commonly develop psoriasis between ages 15 and 25 years. Although most cases involve mild silvery scales and redness over a small percentage of the body, individuals with severe psoriasis and extensive lesions may feel isolated and withdraw from social contact. Up to one-third of those with psoriasis also have psoriatic arthritis, a painful joint inflammation.[16]

Bacterial Infection: Cellulitis

Cellulitis is the inflammation of the skin and subcutaneous tissues, often caused by *Staphylococcus aureus* or streptococcal infection following a break in skin integrity such as a minor laceration or surgical incision. A hot, tender, reddened area of local infection develops at the site of injury. The individual may experience generalized responses to infection, such as fever and malaise.[6]

Fungal Infection: Tinea Pedis (Athlete's Foot)

Tinea pedis, a fungal infection of the foot, causes scaling and maceration between the toes and may cause red scales and blisters across the plantar surface. Tinea pedis is contagious and commonly acquired in shared facilities such as locker rooms or dormitory showers. Treatment includes the administration of an antifungal agent.[6]

Sunburn

Sunburn can range from a mild redness to blistering or deep tissue damage. The following situations increase the risk of sunburn: direct exposure of the skin to the sun; use of tanning booths or sunlamps; and being near snow, water, or at high altitude. Sunburn and recurrent thermal damage to the skin is a risk factor for skin cancers.[12]

Malignant Melanoma

Malignant melanoma is a tumor that develops from melanin-producing skin and mucosal cells. An estimated 7650 people in the United States died from melanoma in 2022, making it the most common cause of skin cancer deaths.[17] The risk of death from melanoma is greatest for people who have light-colored hair, eyes, and skin. Individuals should consult a healthcare provider immediately if moles or lesions show a sudden or progressive change in size, shape, or color. Melanoma cells can metastasize to other organs.[7]

CASE STUDY

From diego cervo/iStock/Thinkstock.

Case Presentation

Mrs. Ramona Garcia, 76 years old, is admitted to a medical respiratory unit with pneumonia after 4 days of increasing difficulty breathing, fever, dehydration, and a productive cough with purulent sputum. She reports that she has been trying to sleep in a chair because she cannot breathe well lying down. She has had very little to eat during the past several days due to a poor appetite and fatigue.

When Mrs. Garcia's breathing becomes comfortable enough for her to be turned briefly for a full skin assessment, the nurse notes a 4-cm red area on the buttock over the left ischial tuberosity that does not blanch to pressure. Recognizing the reddened area as a stage 1 pressure injury, the nurse collaborates with the patient, family, and health team on a plan to prevent further tissue breakdown, including frequent movement and positioning, adequate nutrition, hygiene to prevent the collection of moisture from sweat or urine—which could lead to skin maceration—and the use of pressure-relieving devices.

Case Analysis Questions

1. What physiologic and environmental factors increased Mrs. Garcia's risk for pressure injury?
2. What does "Stage 1 pressure injury" mean, and where does this fall in the scope of tissue integrity?
3. Review the interrelated concepts presented in this chapter. Which additional concepts apply to care for Mrs. Garcia?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 26

Sensory Perception

Genevieve Beaird

Sensory perception represents a complex physiologic process that allows humans to interact efficiently with the environment. The five senses provide the basis for social interactions, communication, and learning. Sensory perception also provides a level of protection, enabling individuals to detect and react to dangers within the environment. Impairment in any of the five senses can lead to significant challenges that negatively affect development, health, and well-being with potentially significant consequences. This concept presentation provides an overview of sensory perception, including ways to recognize those most at risk for impairment and appropriate interventions when impairment occurs.

DEFINITION

To describe the concept of Sensory Perception, it is important first to define both sensation and perception. *Sensation* is the ability to perceive stimulation through one's sensory organs, such as the nose, ears, tongue, skin, and eyes. This stimulation can be internal, from within the body, or external, from outside the body, and includes sensations of pain, temperature, and light. External stimuli are commonly received and processed through the five senses: vision, hearing, taste, smell, and touch. *Perception* is defined as *the process by which we receive, organize, and interpret sensation*. Sensory perception can then be defined as *the ability to receive sensory input and, through various physiologic processes in the body, translate the stimulus or data into meaningful information.*[1]

SCOPE

Both sensation and perception occur within various body systems and through a complex interaction of both sensory receptors and the nervous system. For persons to interact fully with the environment in which they live, it is important that these systems be as functional as possible. This concept represents five senses:

- Vision
- Hearing
- Taste
- Smell
- Touch

With each of these senses, the level of function ranges from optimal functioning to impairment (Fig. 26.1). For the purposes of this concept presentation, impairment of sensory perception includes altered function or perceptual ability but does not include psychiatric symptoms such as hallucinations (auditory, visual, or tactile) or psychosis.

FIG. 26.1 Scope of Concept: Sensory Perception. The scope of sensory perception ranges from optimal functioning to impairment of vision, hearing, taste, smell, and tactile perception.

NORMAL PHYSIOLOGICAL PROCESS

Vision

Vision requires functioning of the visual system, which includes the eyes; surrounding optic muscles; and cranial nerves II (optic), III (oculomotor), IV (trochlear), V (trigeminal), and VI (abducens). The eyelid, conjunctiva, lacrimal gland, and eye muscles all comprise the external eye, which helps to regulate and control the visual input as well as protect the eye, aid with tear production, and move the eye when desired. The internal eye consists of three separate layers: the outer sclera and cornea; the middle layer, which houses the choroid, ciliary body, and iris; and the innermost layer, which is the retina.[2] The iris allows light to enter the eye and regulates the amount of light entering the eye at any given time. The lens bends entering light rays so that they can properly fall on the retina. The ciliary body, which consists of ciliary muscles, is fed by the choroid, a highly vascular structure (Fig. 26.2). The innermost area of the eye is the retina, which transforms light impulses into electrical impulses that are transmitted to the optic nerve. The optic nerve, in turn,

communicates with the brain to produce vision.[2] Cranial nerves II to VI all have important roles in eye function (Table 26.1).

Hearing

Hearing involves the peripheral and central auditory systems. The peripheral system comprises the external, middle, and inner ear and is concerned with hearing and processing sound. The external ear includes the auricle and external auditory canal and functions primarily to collect and transmit sound to the tympanic membrane and to protect the inner ear (Fig. 26.3).[1]

The middle ear is an air-filled space that is located in the temporal bone. It is connected to the throat/nasopharynx by the Eustachian tube, whose primary function is to equalize, or vent, air pressure on both sides of the eardrum. The Eustachian tube opens to allow airflow when one is chewing and swallowing. Vibrations of the tympanic membrane (or eardrum), which separates the external ear from the middle ear, cause the auditory ossicles (malleus, incus, and stapes) to further amplify the sound waves and transmit these airborne waves to the fluid-filled inner ear.

The inner ear consists of a bony labyrinth surrounding a membrane. Within this structure is the cochlea, closely connected to hearing ability, and the vestibular system, which helps to control balance.[3] Once sound waves reach the inner ear, the hair cells or sensory receptor cells of the cochlea pick up the vibrations. The cochlear cells, by means of a complex series of mechanical wave activities, innervate impulses that are carried by nerve fibers to cranial nerve VIII (vestibulocochlear) to the brain—where the cerebellum receives the signals and helps to maintain a sense of balance—and then further, reaching the auditory area of the temporal lobe for hearing.[4]

Taste

A person's gustatory system, or sense of taste, involves various cranial nerves and is directly related to the ability of the mouth and tongue to detect the chemicals—also referred to as

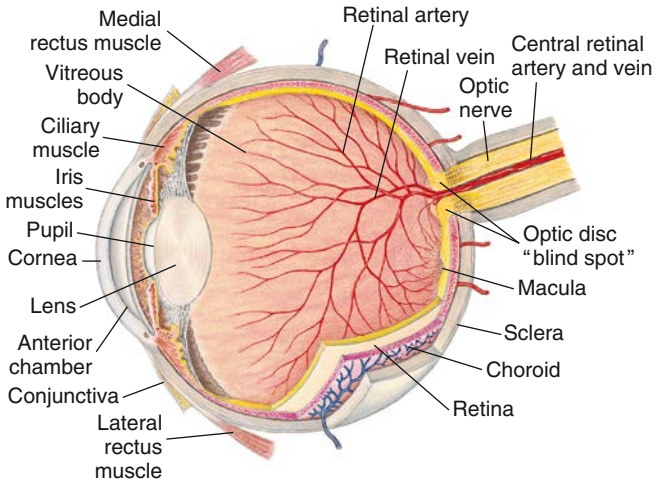


FIG. 26.2 Structures of the Eye. (From Ball, J., Dains, J., Flynn, J., Solomon, B., & Stewart R. [2015]. *Seidel's guide to physical examination* [8th ed.]. St Louis: Mosby.)

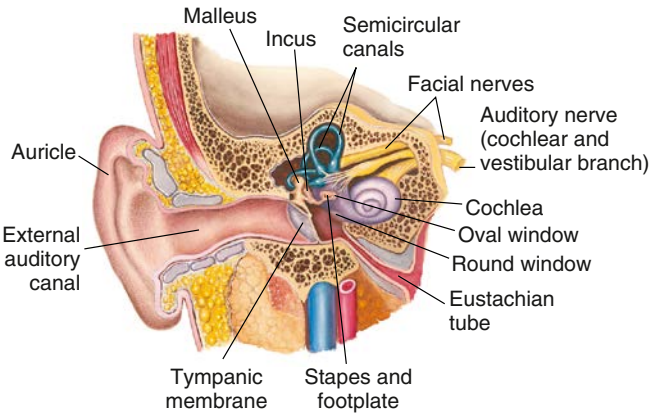


FIG. 26.3 Structures of the Ear. (From Ball, J., Dains, J., Flynn, J., Solomon, B., & Stewart R. [2015]. *Seidel's guide to physical examination* [8th ed.]. St Louis: Mosby.)

TABLE 26.1 Cranial Nerves and Their Function

Cranial Nerve	Function
I: Olfactory	Smell reception and interpretation
II: Optic	Visual acuity and visual fields
III: Oculomotor	Raising eyelids, extraocular movements, and papillary constriction
IV: Trochlear	Downward and inward eye movement
V: Trigeminal	Jaw opening and closing; sensation to eye, forehead, nose, mouth, teeth, ear, and face
VI: Abducens	Eye movement laterally
VII: Facial	Controls most facial expressions; taste with anterior two-thirds of tongue; excretion of tears and saliva
VIII: Acoustic	Hearing and equilibrium
IX: Glossopharyngeal	Swallowing and speaking; sensation of nasopharynx, gag reflex, and taste to posterior third of tongue; secretion of salivary glands and carotid reflex; certain speech sounds and swallowing
X: Vagus	Sensation behind ear and portion of external ear canal; secretion of digestive enzymes; peristalsis; carotid reflex; heart, respiratory, and digestive processes
XI: Spinal accessory	Turning one's head and shrugging one's shoulders
XII: Hypoglossal	Tongue movement, speech, and swallowing

Modified from Ball, J., Dains, J., Flynn, J., Solomon, B., & Stewart R. (2015). *Seidel's guide to physical examination* (8th ed.). St Louis: Mosby.

tastants—in the foods that we eat. These taste signals are initiated by chemical stimulation of the taste buds, located primarily on the surface of the tongue and in the pharynx. Sensory receptor stimulation—conducted via cranial nerves VII (facial), IX (glossopharyngeal), and X (vagus)—is then transmitted to the nucleus of the solitary tract in the medulla of the brain and also sent to other areas within the brain. Messages about smell converge here, along with visceral sensory fibers from the esophagus, stomach, intestines, and liver, allowing taste and odor signals to initiate digestive activity.[5]

Smell

The sense of smell is controlled primarily by cranial nerve I (olfactory) and plays a critical role in controlling the desire to eat and maintain a healthy nutritional state.[6] Smell depends on sensory receptors located in the mucous membranes of the upper and posterior parts of the nasal cavity that respond to airborne chemicals. These chemicals bond to the ciliary receptors in the nose, which trigger a series of reactions that eventually lead to signals traveling along the olfactory nerve to the brain. The brain then processes the information and makes a determination as to the type of smell. A 2014 study determined that humans can identify more than one trillion smells.[7]

Touch

The perception of tactile simulation originates in the sensory receptors throughout the body. The receptors send axons to the spinal cord through the dorsal root and ultimately converge in the somatosensory cortex. This somatic organization allows for the precise localization of signals related to fine and crude touch, vibration, pressure, temperature, itch, and pain.[4]

Age-Related Differences

Infants and Children

Significant changes occur during growth and development in early infancy that primarily affect visual acuity and hearing perception. Although the eyes are physically developed by the eighth month in utero, making the fetus capable of opening its eyes, the development of gross visual ability to recognize objects, perform purposeful eye movement, and color recognition primarily occurs during the first year of life. The 1-year-old typically has developed 20/50 vision or is able to see at 20 feet what an individual with normal vision can see at approximately 50 feet. Most research suggests that visual acuity progressively improves in early childhood, reaching 20/20 or better by age 3 to 5 years. However, 20/40 or better is generally required for passing mandatory state vision standards upon entry into primary school for 4- and 5-year-olds and 20/32 or better for children 6 years and older.[8,9] The ear structures and the ability to hear sounds are developed during the early part of embryonic life; thus, hearing is fully developed at birth. Infants have the ability to detect a few distinct odors, such as the smell of the mother's breast milk; however, refined taste discrimination is limited until infants reach approximately 3 months of age.[10] Infants also have a well-developed sense of touch and are able to respond to peripheral tactile stimulation at birth.[10] This ability to distinguish tactile stimulation develops rapidly from a tight hand grasp at 1 month of age to pincer grasp, holding a cup, and walking steadily by 1 year of age.

Older Adults

Research illustrates that a decline in sensory function occurs with aging. This is increasingly prevalent among the older population and is believed to be due in part to genetics factors, lifestyle choices, and environmental exposures.[11] The National Social Life, Health, and Aging Project began a major research study in 2005 that is exploring the health and social factors of older Americans as they age. This is the first national study attempting to provide a comprehensive assessment of sensory function among older adults. The study has examined more than close to 5000 older adults.[12] A recent analysis of the data show declines in all five senses within this population.[13]

Age-related changes in vision begin in the fourth decade, when reduced elasticity of the lens occurs, making it difficult to focus on near objects (presbyopia).[13] Age-related hearing loss (presbycusis) is caused by changes in the inner ear or in the nerve pathways from the inner ear to the brain. The changes result in a decreased ability to hear and process sound. The process is generally gradual, so someone may not realize they have lost ability to hear over time.[14] Another physiologic change with aging is reduced olfactory epithelium along with a decreased number of nasal ciliary receptors available to assist in sending olfactory signals to the brain. Not only is the ability to smell decreased with aging but so is the ability to distinguish between various smells. Reduced sense of smell typically begins at approximately age 60 years, with increasing loss into the 70s and 80s. Close to 40% of individuals 80 years or older experience a loss of the ability to smell.[15] There is significant variability in individuals' age-related declines in taste. It is thought to be related to both the decrease in olfaction and potential chewing problems connected to poor dental hygiene or tooth loss.[16] Another contribution to decreased taste may be less saliva production with age.[17] Furthermore, decreased levels of certain hormones, such as testosterone, in the older adult population can contribute to a decrease in cell growth, including taste cells located in the taste buds. The decrease in the number of taste cells, thus, leads to a decrease in the sense of taste.[16] Evidence suggests that aging and dementia-related diseases such, as Alzheimer's disease and Parkinson's disease, can lead to a decline in the detection and recognition of smells.[16]

Both perceptual and structural changes to touch are associated with aging and typically are observed after 60 years of age.[18] Tactile thresholds tend to increase with aging. [19] An example of this is a delay in the process of sensing a wrinkled sheet under the back or a slight prick from a small needle, thus resulting in potential injuries.[20] A study comparing sensation thresholds of older (mean age 69.8 years) and younger (mean age 28 years) subjects found that older subjects required two to more than five times the tactile stimulation required by the younger group.[21] In addition, certain tests that measure the ability to assess tactile sensation tend to show a decline in function that corresponds with aging—a decline of 1% per year between the ages of 20 and 80 years.[22] Age-related changes have typically been tested on the fingertips; however, research indicates that the hypothenar

eminence shows the most significant changes with age. As age-related declines are multifactorial, it is recommended to test multiple sites including both fingers and palms.[19]

VARIATIONS AND CONTEXT

A number of problems and conditions are represented by this concept and are grouped by problems with vision, hearing, smell, taste, and tactile perception. Common to all senses, conditions affecting sensory perception can be primary or secondary problems, representing both acute and chronic change, caused by congenital abnormalities, primary and chronic conditions, treatment-related negative effects, and acute injury.

Problems With Vision

Problems with vision are seen across the life span. Although most individuals experience changes in vision associated with the normal aging process (previously discussed), there are many medical conditions that affect vision. Poor vision is defined as *best-corrected visual acuity of less than 20/40 in the better-seeing eye*, and blindness is considered corrected visual acuity of 20/200 in the better-seeing eye. Visual problems can occur as primary eye disorders (e.g., cataracts, glaucoma, retinal detachment, and macular degeneration), as secondary disorders caused by systemic chronic conditions such as diabetes or hypertension (diabetic retinopathy), or due to congenital abnormalities (e.g., a congenital cataract).[23] As of 2015, blindness affected more than 1 million Americans, and an additional 12 million are visually impaired. This number is predicted to double by 2050 because of the increasing epidemics of diabetes and other chronic diseases as well as the rapidly aging population.[24]

Insult or injury to the eye at any age may result in visual impairment or permanent blindness. Eye injuries are common in young adults and in children, thus having potentially lasting consequences into adulthood. Younger children are at risk for eye injury from accidental blunt trauma and chemical burns caused by household cleaners. Sports and recreation related eye injuries are also very common in children.[25] Eye malignancies, although rare, can have devastating effects. Uveal melanoma is the second most common form of melanoma and often metastasizes from the eye to other organs.[26] Retinoblastoma, the second leading cause of intraocular cancer, is found in children between the ages of 14 months and 3 years.[23] Ocular infections in the first few weeks of a newborn's life is increasingly uncommon in well-resourced areas but are often caused by previously untreated maternal-induced infection by *Neisseria gonorrhoeae* and/or *Chlamydia*. Widespread prophylaxis treatment with intraocular antibiotics has contributed to the decline of these infections in newborns.[27]

Problems With Hearing

Hearing impairment is among the most prevalent chronic health conditions in the population older than 70 years of age, resulting in substantially reduced quality of life. Studies estimate that two-thirds to three-quarters of individuals 70 or older have some degree of hearing impairment.[28,29] Problems with hearing result from a disruption in the mechanisms required for the transmission of sound and/or nerve impulse within the ears. Sensorineural hearing loss, the most prevalent type of hearing loss, occurs when there is disruption in the afferent nerves necessary to transmit impulses. Conductive hearing loss results when there is disruption in the transmission of sound or vibration in the outer ear canal and middle ear structures. Some individuals may experience some degree of both types of hearing loss, described as a mixed hearing loss. Many subtypes of sensorineural hearing loss exist, including congenital hearing loss, genetic hearing loss, noise-induced hearing loss, presbycusis, sudden sensorineural hearing loss, and autoimmune hearing disorders.[30] Conductive hearing loss can be a result of cerumen impaction in the ear canal or the more serious consequence of an acute ear infection leading to a tympanic membrane perforation or rupture. Hearing loss at birth or congenital hearing loss occurs in 1 to 2 per 1000 newborns, of which 50% is suspected to be genetic related and 25% is nongenetic in origin.[31] Other genetic syndromes (such as Down and Alport syndromes) are often associated with hearing loss.

Problems With Taste and Smell

Multiple factors influence the perception of taste and smell across the life span. These changes can be sudden and temporary when associated with an acute viral upper respiratory infection or long-term changes when associated with the untoward effects of chemotherapeutic cancer-related treatment.[32,33] Some chronic conditions of adulthood, such as dementias, strongly correlate with loss of smell.[34] Among infants and children, problems with taste and smell are usually associated with direct injury or trauma to the olfactory ciliary receptor sensory and neural pathways, or they are associated with congenital abnormalities. During the SARS-CoV-2 pandemic, infected individuals often reported a loss of taste and smell as early symptoms of the virus. These symptoms likely stem from inflammatory responses to the virus.[35]

Problems With Tactile Sensation

Acute injury or trauma to the head, spinal cord, or peripheral appendages may result in disruption of sensory perception. Nontraumatic changes associated with the sense of touch are most common and are frequently caused by the progression of comorbid disease. Normal aging affects touch, as is experienced with the other senses as well. Studies indicate that it is likely that both central nervous processing (perception) of stimuli and a structural component (i.e., reduced elasticity in skin) contribute to diminishing touch sensation as people age.[18]

CONSEQUENCES

Impaired sensory perception can lead to a number of consequences, depending on the type, extent, and number of impairments and also adjustments made to the impairment. Sensory-perceptual impairments share many of the same types of consequences, including a reduced overall quality of life. There is significant risk for many types of injury as a result of impairments in sensory perception (such as falls, burns, cold, or pressure) and the inability to smell or taste spoiled food or

to smell toxic gases or smoke. Impaired vision and hearing can contribute to significant developmental delay and learning disabilities among infants and children and a loss of functional ability for adults. Psychosocial consequences can include difficulty establishing vocations, impaired interpersonal relationships, social isolation, depression, anxiety, and loss of self-worth. Another consequence less easily measured is the financial burden many of these impairments represent—both in direct cost of treatments and assistive devices and in the loss of income if the impairment represents an inability to work.

RISK FACTORS

All individuals—regardless of age, gender, ethnicity, or socioeconomic status—are at risk for disturbances in sensation and perception. However, there are certain populations and individual factors associated with increased risk.

Populations at Risk

The elderly population comprises those at the highest risk as a result of changes in sensory perceptual functioning associated with the aging process (previously described). There is limited evidence on other population risk factors related to sensory perception deficits. Gender disparities exist with greater impairments found in men in all senses except for corrected vision.[36] Visual acuity begins to decline in the fourth decade of life, and by the sixth decade most individuals will experience some degree of declining visual acuity.[23] Hearing loss related to aging affects an estimated 43% of individuals older than age 70 years of age.[37]

Individual Risk Factors

Significant individual risk factors include genetic predisposition, adverse effects of medications, chronic medical conditions, health-related behaviors, and occupation.

Congenital Conditions and Genetics

If not detected early in life, congenital conditions that may result in detrimental long-term effects on an infant's visual perception include congenital glaucoma, congenital cataracts, and retinoblastoma (intraocular malignancy).[23] Congenital hearing loss is commonly the result of congenital malformations in the structure or functional components of the auditory system, although more than half of infants born with hearing loss have no significant risk factors.[38] Hearing loss at birth may be associated with maternal infection during pregnancy (e.g., measles) or family history of childhood hearing loss. Additional risk factors for congenital hearing loss include history of meningitis, low Apgar score, intensive care unit admission, premature birth, maternal diabetes, preeclampsia, and elevated bilirubin.[39]

Adverse Reactions and Side Effects of Medications

Changes in sensory perception are a common side effect or adverse effect of many medications, particularly when taken for a long time, as with chronic illness (Table 26.2). Visual disturbances are among the most common undesirable side effects associated with medication therapy. Examples include anticholinergic side effects (i.e., dry eyes), worsening glaucoma, increasing cataract formation.[40] Ototoxicity, another potential adverse effect due to medication, can result in permanent or temporary inner ear problems that can affect hearing, balance, and speech. This represents one of the main preventable causes of deafness, but diagnosis and monitoring have improved over the past few years.[41]

Many drugs also affect both taste and smell, having an effect on adherence with treatments. Drug-induced taste disorders are reported to be the most frequent cause of taste disturbances. Patients undergoing chemotherapy commonly report taste disturbances.[42] It is often reported that up to half of all cancer patients experience changes in their taste and/or smell perception.[42,43] Alterations in taste and smell that are considered severe are associated with poor nutrient intake, reduced food enjoyment, and reduced quality of life.[44] Other drugs that cause taste disturbances include antimicrobial drugs, antivirals, antihypertensives, calcium channel blockers, and diuretics. If it is possible for the medication to be discontinued, the person's sense of smell and taste is often restored; however, some medications induce long-term changes in taste and smell and occasionally cause permanent loss.[43]

Paresthesia or peripheral neuropathy can also be caused by various medications, including select antineoplastic agents. Certain anticonvulsants can cause paresthesia in the hands, feet, face, and lips, which does not tend to improve until the medication is discontinued.[45]

Acute Injury

Head injuries are a risk factor for sensory impairment. Accidental and nonaccidental trauma to the eye in childhood is common. Ocular damage is dependent on the type of impact,

TABLE 26.2 Common Medications That Can Affect Sensation and Perception

Drug Classification	Possible Side Effects
Antihistamines (loratadine, diphenhydramine)	Blurred vision, dry mouth
Antihypertensives (β blockers, calcium channel blockers, ACE inhibitors)	Blurred vision, alterations in taste and smell
Miotic eye drops (pilocarpine, carbachol)	Changes in vision, increase in nearsightedness, blurred vision
Antiseizure drugs (topiramate, acetazolamide)	Numbness in hands and feet, dry mouth, tinnitus (ringing in ears), blurred vision, eye pain, metallic taste
Diuretics (furosemide)	Hearing loss, tinnitus, alterations in taste and smell
Chemotherapeutic drugs	Alterations in taste and smell, paresthesia
Antibiotics	Alterations in taste and smell, ototoxicity

ACE, Angiotensin-converting enzyme.

with high-velocity impacts often causing extensive damage. Nonaccidental inflicted neurotrauma (formerly known as shaken baby syndrome) occurs in an estimated 1300 abused children annually, resulting in death within the first few days in approximately 20% of cases from the head trauma sustained.[23] Among children who survive, many develop traumatic retinoschisis as a result of retinal damage. Penetrating and blunt trauma can result in fractures to the temporal bone, leading to sensorineural or mixed hearing loss.

Chronic Medical Conditions

A number of medical conditions place an individual at risk for sensory perception impairment as a matter of the disease sequelae. Some of the most common medical conditions leading to such impairments are presented in Box 26.1.

BOX 26.1 Medical Conditions or Treatments Leading to Changes in Sensory Perception

Vision
- Retinopathy of prematurity
- Diabetes and hypertension-induced retinopathy
- Eye infection
- Foreign body of eye
- Corneal abrasion
- Traumatic eye injury
- Optic neuropathy and increased intraocular pressure

Auditory
- Acute suppurative otitis media
- Otitis media with effusion
- Tympanic membrane perforation
- Traumatic ear injury
- Foreign body

Olfactory
- Sinus and other upper respiratory infections
- Brain injury or trauma
- Parkinson's disease
- Alzheimer's disease
- Medications and chemical exposure
- Head and neck radiation
- Growths or tumors of nasal cavity

Gustatory
- Head and neck surgery
- Radiation to head and neck
- Head injury
- Oral abscess and other dental problems
- Brain
- Exposure to chemicals and medication
- Burning mouth syndrome

Somatosensory
- Systemic sclerosis
- Raynaud syndrome
- Cerebrovascular accident or stroke
- Third-degree burns
- Spinal cord injury
- Peripheral vascular disease

Brain tumors, cancers, head injuries, infectious diseases, stroke, and some cardiovascular diseases, such as hypertension, are risk factors for visual and auditory problems.[46] Sinus and upper respiratory tract infections, seasonal allergies, and also dental problems can alter both the sense of smell and the sense of taste. In addition, nasal polyps and exposure to certain environmental chemicals can cause disturbances in both smell and taste.

A cerebrovascular accident (CVA) or stroke can affect many aspects of sensation and perception. Alterations in taste sensation, balance issues, and visual disturbances can result from a stroke depending on the area of the brain affected. Children and adults with autism report sensory disturbances such as insensitivity to pain as well as unusual sensory responses to visual, auditory, tactile, and olfactory stimulation. Although many children with developmental delays have sensory impairments, these problems tend to be more prevalent in children with autism.[47]

Lifestyle Choices and Occupation

Certain lifestyle choices can increase the risk of sensory and perceptual alterations. Smoking creates an increased risk for alterations in both smell and taste primarily because it damages the taste receptors on the tongue and sensory receptors in the nose. However, when a smoker who experiences a decreased sense of smell and taste stops smoking, both senses typically return to their proper level of functioning.[48] Individuals exposed to loud noise at work or during recreation activities are at risk for hearing deficit because such loud vibrations damage the small hair-like cells in the inner ear. This loss can be spontaneous or may occur over time, typically when the sound is at or above 80 decibels. Once damage has occurred, it is typically irreversible.[49] Individuals who work where flying debris is commonly present (such as miners and steelworkers), and those who work with certain chemicals are at high risk for eye injuries, especially when they are not wearing protective equipment.

ASSESSMENT

A comprehensive health assessment is essential to determining current health status, identifying present health risks, predicting future health risks, and identifying appropriate health-promoting activities. An assessment includes conducting a history and examination as well as diagnostic testing when sensory perceptual conditions are suspected.

History and Physical Examination

When performing any type of physical assessment, a thorough health history (including past medical, surgical, family, and social history) is taken. For infants, it is important to ask about prenatal and maternal history. Because of the potential for adverse effects with medications, a list of all medications (prescription and over-the-counter) used by the patient should be included. Health history questions should also specifically ask about sensory perceptual symptoms/problems for each of the categorical areas. A physical examination, particularly related to

symptoms, is crucial. Common symptoms that suggest impairments are described for each category.

Vision

Ask the patient about changes in vision (blurred vision, difficulty seeing close up and/or far away, floaters), peripheral visual changes, and eye pain. For the infant and toddler, ask caregivers if tracking of the eyes has been observed when the child is watching movement and to ensure that the eyes have been observed moving in synchrony.

Examination of the eyes starts by inspecting external eye structures—including the eyebrows, eyelashes, and eyelids—paying attention to symmetry, size, and extension. In addition, the nurse should palpate both the eyelid and the eye and inspect the conjunctiva—the thin membrane that covers the inner eyelid and sclera—closely for redness and irritation. The sclera should be predominantly white, and the lens should be transparent.

Visual acuity (a measure of how well a person sees) is also included in the examination. Infants and young children are challenging to test for visual acuity; however, it is essential to do a thorough penlight examination of the cornea. At approximately 6 months of age, the cover test is helpful to screen for possible visual loss. The cover tests assesses movement and alignment of the eyes when a child is focusing on an object. After age 3, visual testing is achieved using the Snellen letter chart for distance vision and the Rosenbaum vision screener for close vision (approximately 14 inches). Visual acuity is recorded as a fraction in which the numerator shows the distance that the patient was from the chart, typically 20 feet, and the denominator represents the distance that the average eye can read that same line of the chart.[2] For example, 20/60 means a patient can see clearly at 20 feet what the average eye sees at 60 feet.

Eye movement is typically controlled by cranial nerves III, IV, and VI and by six extraocular muscles. It is tested by having the patient follow the examiner's finger, keeping the head stationary as the finger moves through the six cardinal fields of gaze.[2] A person's inability to follow through all the fields can indicate a host of visual disorders. Nystagmus—a rapid, involuntary movement of the eye—can often be detected during this part of the visual assessment.

The internal eye exam allows for visualization of the optic disc, arteries, veins, and retina. This is done using an ophthalmoscope and often following dilation of the pupils, although this is not always necessary. Some unexpected findings include hemorrhages, optic disc swelling (referred to as papilledema), or cotton-wool spots, which are poorly defined yellow areas on the retina and often related to damage of the nerve fibers.[2] Pupils should be checked for response to light in both the adult and the pediatric population.

Hearing

Difficulty hearing, tinnitus, and ear pain are common symptoms that prompt a patient to have the auditory system evaluated by a healthcare professional. For the pediatric population, frequent problems with otitis media are common and can include symptoms such as ear drainage, pain, and fever.

Inspection of the outer portion of the ear (also known as the auricle or pinna), includes noting symmetry, size, shape, and possible discharge. Inspection of the inner ear is performed using an otoscope. The nurse should look for cerumen (earwax), noting its color, amount, and any odor if present.[2] The tympanic membrane (see Fig. 26.3) should be translucent, with a pearly, gray color. Abnormal findings include a bulging or retracted tympanic membrane (or eardrum) and/or perforations of the tympanic membrane. Evaluation of hearing is usually done by assessing the patient's ability to hear during general conversation. If a hearing deficit is suspected, further diagnostic studies are indicated.

Taste

The most common complaint associated with the sense of taste is a lack of one. Most patients who think they have a taste disorder actually have a problem with smell.[50] Obtaining a complete list of current medications is especially important, because many medications can cause alterations in taste.

Inspect the tongue and oral cavity, searching for any abnormalities such as an atrophied tongue or a tongue that does not appear red and moist.[2] Overgrowth of yeast or ulcerations or nodules should be noted. However, patients with taste disturbances often have normal-appearing, well-functioning tongues. Several validated taste tests are available[51]; however, they may be costly to obtain and time-consuming to perform. Thus, before doing further testing, it is prudent to ensure that a patient has a good sense of smell.

Smell

Assessing the sense of smell is first done by obtaining a detailed history, including medications the patient is taking, and assessing for recent upper respiratory tract complaints such as sinus infections, allergies, and nasal polyps. Examination includes inspection of the nose, searching for abnormalities such as nasal discharge or blockages, and evaluation of the color and size of the nasal passages. If discharge is observed, the nurse should note the color, consistency, odor, and amount. Nasal breathing is assessed by pinching one naris or one nostril and asking the patient to breathe in and out with his or her mouth closed, alternating nostrils. Breathing through each unobstructed side of the nasal passage should be quiet and effortless.[2]

Touch

Touch and balance are largely regulated by the body's neurologic system. Alterations in perception can often manifest as balance disturbances. Balance is routinely tested by the Romberg test, which involves asking patients to stand with their feet together and arms at their sides with their eyes first open and then closed. Some slight swaying is normal, but the patient should be able to stand still for the most part. The nurse should also observe the patient's gait for abnormal findings, such as shuffling, staggering, and asymmetric stride.

Evaluation of tactile sensory function is accomplished by having the patient identify stimuli affecting the major peripheral nerves, including the hands, arms, feet, legs, and abdomen. Cranial nerve V, the trigeminal nerve, is most closely

associated with tactile sensory function. The patient should be able to correctly identify if a stimulus feels sharp or dull and the location of the sensation. In addition, the patient should be able to properly differentiate temperature (hot/cold), indicate the location of the stimulus, including the correct side of the body that is being stimulated.[2] Monofilament testing is a common and accurate way to assess for peripheral neuropathies that cause decreased sensation to the extremities. Monofilaments are single-fiber nylon threads that are placed on the patient's skin, typically on the feet. An abnormal finding is that the patient will not be able to detect the presence of the filament.[52]

Diagnostic Tests

After a basic history and a physical assessment have been completed, occasionally further diagnostic testing is warranted. This is described by sensory classification.

Vision

Some common visual diagnostic tests include evaluating peripheral vision by testing visual fields with automated perimetry. A patient looks straight ahead into a device with a concave dome while small flashes of light are shown sporadically in all visual fields. The patient then pushes a button every time they see a light. Decreased visual field acuity could be indicative of glaucoma, optic nerve damage, and other visual problems. Another example is noncontact tonometry, or the puff-of-air test. This involves an eye's resistance to a puff of air from a small handheld jet, which calculates a range of intraocular pressure (IOP). Elevations in IOP can be indicative of glaucoma. Radiographic examinations of the brain may be indicated if a tumor is suspected of causing visual disturbances.

Hearing

If hearing loss is suspected, a referral to a licensed audiologist is often done for further testing. A pure-tone air conduction audiometric test determines the faintest tones a person can hear at selected frequencies ranging from low to high. Earphones are usually worn so that information can be obtained for each ear separately.[53] Other common screening methods used often with infants are otoacoustic emissions (OAEs) and auditory brainstem responses (ABRs). OAEs are sounds from the inner ear after the cochlea has been stimulated by a sound; these are measured by using a small probe in the ear canal. Those with hearing loss do not produce such sounds. The ABR test is performed by placing electrodes on the head to record brain wave activity in response to sounds.[53]

CORE COMPETENCIES

Sensory Perception

- Obtain a complete and accurate history related to sensory function.
- Perform a clinically relevant, holistic health assessment of sensory organs and function.
- Distinguish between normal and abnormal findings in sensory function.
- Educate individuals and families on health promotion practices and illness prevention related to sensory function.

CLINICAL MANAGEMENT

Primary Prevention

Many measures exist to prevent injury and disease to the eyes, ears, mouth, and nose. Basic measures to protect the eyes and ears include the use of protective devices; patient education related to these practices is essential. Safety goggles are recommended for selected sporting activities and work activities in which small particles (e.g., sawdust, wood chips, metal pieces, and vegetation debris) are present in the air. More than 20,000 workers in the United States receive medical treatment each year because of eye injuries that occur on the job.[54] The use of earplugs or other ear protection is also a requirement in many work settings involving loud machinery and is suggested for other activities such as attending loud concerts. Wearing a helmet when riding a bicycle, skiing, or participating in contact sports can prevent brain injury—another cause of sensory disturbances.

Primary prevention extends beyond wearing protective devices. Newborns receive erythromycin eye ointment in their eyes at the time of birth to help reduce the chance of the mother transmitting certain sexually transmitted diseases that can affect the newborn's vision. Reinforcing the importance of proper oral hygiene to prevent diseases of the mouth is essential to reducing the risk for changes in ability to discriminate taste or smell.

Secondary Prevention (Screening)

Screening tests are common for vision and hearing. There are no routine screenings to evaluate the sense of smell or taste. Screening for sensory function is often performed as part of the physical assessment.

Vision

Vision screens are recommended across the life span. Starting in the newborn period, a pediatric eye evaluation is recommended at each well-child visit. Eye evaluations for children up to 3 years of age should occur at all well-child checkups and include history, assessment, external inspection of the eyes and lids, ocular motility assessment, pupil examination, and red reflex examination. After age 3 years, the evaluation should also include age-appropriate visual acuity measurement and an attempt at ophthalmoscopy. Any abnormal findings would warrant a referral to a pediatric ophthalmologist.[55] Adults up to 40 years of age should receive an eye exam at least every 2 years.[56] The same recommendation is applicable for middle-aged adults, those up to age 60 years; however, special attention should be paid to individuals with chronic conditions such as diabetes, heart disease, and hypertension, who would then be considered to be high risk for the development of visual problems. In addition, this is the time frame in which presbyopia often begins to develop.

For adults older than age 60 years, yearly eye exams are recommended to screen for simple vision loss related to aging as well as age-related eye disorders such as glaucoma and macular degenerative disease.[54] Eye examination with dilation and careful inspection can often diagnose these problems, but tonometry is necessary when considering glaucoma, a disease in which fluid pressure in the eye is consistently elevated, causing damage to the optic nerve and leading to loss of vision. Tonometry involves the

use of a covered probe to gently touch the corneal surface several times to record the average intraocular pressure. The cornea is anesthetized first with eye drops before the pressures are measured. Normal IOP is 10 to 22 mm Hg, and pressures greater than 22 mm Hg are considered abnormal. Those with ongoing pressures greater than 27 mm Hg are at a higher risk of glaucoma.[3]

Hearing

Screening for hearing is recommended for all neonates by 1 month of age; if abnormal, they should be repeated by 3 months of age.[57] Hearing tests are usually done within 48 hours of birth in the hospital setting. Infants who fail the hearing test are referred to their local Early Hearing Detection and Intervention program for follow-up. However, sometimes the failure is due to external ear canal vernix or middle ear fluid resulting in temporary hearing loss.[58] The two common screening methods used with infants are OAEs and ABRs, which have already been discussed. Outer and inner ear inspection, with the use of an otoscope, is typically done at each well-child visit; for adults, however, otoscopic inspection is usually completed only when the patient reports a hearing problem.

Collaborative Interventions: Vision

For many visual problems, especially those associated with decreased visual acuity, corrective lenses (glasses and contact lenses) are a relatively easy and inexpensive treatment.

Surgery

There are a number of surgical procedures performed to treat conditions of the eye. Laser-assisted in situ keratomileusis (LASIK) is a surgical procedure that involves cutting a small flap in the cornea and then retracting the flap. Pulses from a computer-controlled laser then remove small parts of the cornea, permanently reshaping its surface. The reshaped cornea can better focus light onto the eye and onto the retina, allowing for improved vision.[59] The most common treatment for a cataract is the surgical removal of the lens. Microsurgical and laser procedures are also available to treat many other visual disorders, such as glaucoma, and are being done more frequently.[60]

Pharmacotherapy

Certain visual disorders can be initially treated with β-adrenergic eye drops, which decrease the production of aqueous humor. Other types of eye drops prescribed include prostaglandin analogs, adrenergic agonists, and carbonic anhydrase inhibitors. Oral forms of carbonic anhydrase inhibitors can also be prescribed. Individuals with wet age-related macular degeneration may have the option of injectable drug treatments and photodynamic therapy.[61] Other common forms of ophthalmic pharmacotherapy include the use of antibiotic, steroidal, and analgesic agents.

Collaborative Interventions: Hearing

Surgery

For recurrent otitis media in children, unresolved by the use of an antimicrobial, surgical intervention may become necessary. Tympanostomy tube placement is one of the most common operative procedures in childhood. The procedure involves a small incision (myringotomy) made in the tympanic membrane, removal of fluid, and the insertion of a small tube. This surgery is typically done as an outpatient procedure under general anesthesia.[58]

Cochlear implants are devices that are surgically implanted to provide direct electrical stimulation to the auditory nerve. Cochlear implants are approved by the U.S. Food and Drug Administration (FDA) for children as young as 12 months and adults with profound hearing loss, with some studies seeing success with even younger children.[62] Although a cochlear implant may not restore complete hearing, it may allow for the perception of sound.

Adaptive Methods

Adaptive methods provide additional options for hearing and vision problems and include braille, guide dogs, sign language, closed-caption television, assistive listening, and newer technologies. As previously mentioned, if a person is experiencing sensory loss from medication therapy, it is likely that discontinuing the therapy may result in the deficit being restored.

Collaborative Interventions: Smell and Taste

Individuals with disorders of the nose, sinuses, and mouth that affect taste and smell may require surgical intervention or the use of medication therapy to improve or restore sensory perception.

Surgery

Surgical removal of nasal polyps, chronically inflamed sinus tissue, and retained secretions is performed to restore a normal sense of smell. Oral and dental surgical procedures to remove diseased tissue or teeth aim to restore normal flora and function.

Pharmacotherapy

The use of an intranasal glucocorticoid spray is recommended to treat allergic rhinitis and reduce or eliminate inflammation in the nasal and sinus passages.[63] Further use of medications such as antihistamines is effective for the treatment and control of allergic rhinitis, which often causes chronic sinus congestion and polyposis.

Adaptive Methods

Avoidance measures to reduce or eliminate environmental chemicals and toxins and/or allergens with the use of masks and filtration systems are advised, furthering the preservation of the sense of smell and taste.

Collaborative Interventions: Touch

Loss of the sense of touch is most often associated with comorbid disease; therefore, treatment with surgery and/or medications is aimed at controlling or eliminating the underlying cause.

Adaptive Methods

For individuals with an impaired sense of touch, the use of adaptive devices aimed at ensuring safety in the home and injury

prevention is imperative. This can be achieved in many ways, from setting the hot water heater to a lower temperature to prevent unintentional burns to the wearing of proper footwear to prevent trauma to the feet when walking and gain better balance control. Protecting the fingertips during cold temperatures is imperative for individuals with Raynaud syndrome and other peripheral vascular problems to prevent frostbite.

CLINICAL NURSING SKILLS FOR SENSORY PERCEPTION

- Assessment
  - General assessment
  - Assessment of senses
- Irrigation of eye and ear
- Medication administration
- Oral hygiene demonstration/teaching
- Prevention strategies for occupational and recreational exposure to hazards
  - Eye protection
  - Hearing protection
  - Other proper protective equipment
- Foreign body removal
- Age-appropriate teaching strategies for safety in the home (e.g., childproof cupboard locks and hot water heater setting)
- Assistive devices
  - Hearing aid
  - Eyewear
  - Cane/walker/wheelchair
  - Prosthetics (e.g., eye and lower limb)

INTERRELATED CONCEPTS

As previously mentioned, sensory perception is interrelated with several other concepts discussed in this textbook, especially Intracranial Regulation, Pain, Mobility, Nutrition, Development, and Functional Ability (Fig. 26.4).

The brain is an amazing organ with more than 100 billion cells that regulate sensory input and output. For this reason, **Intracranial Regulation** is highly interrelated to this concept. This is most notable in the presence of brain disturbances, when presenting symptoms are seen with changes in sensory function. **Pain** is a sensation that most people do not want to experience; however, sometimes pain is necessary to provide the brain with the signals needed to cause action to remove the pain source. Certain disorders, especially neurologic disorders, have the potential to alter sensation and perception, thus affecting **Mobility**. For example, when a person has suffered a neurologic impairment such as a CVA, or stroke, mobility is often impaired due to paralysis and paresthesia of an arm or leg.

The inability to taste and smell reduces the desire to eat because these senses have a vital role in initiating the digestive process. Failure to consume sufficient quantities and types of food can lead to **Nutrition** impairment. For example, patients undergoing chemotherapy often experience taste disturbances that decrease their desire for food, leading to nutritional deficiencies.

Development can be significantly affected among children with limitations in hearing and vision. Such problems can lead to delays in speech, language, and communication skills. Adaptation to special methods of communication must begin early in life to ensure progression throughout this critical developmental period to avoid isolation, reduced academic achievement, and poor self-concept.[64] Among adults, **Functional Ability** may be impeded when an individual experiences either diminished or complete loss of sensory perception. Adequate sensory perception allows humans to interact efficiently within the environment and provides the basis for social interactions, communication, and learning. Impairment at any age or stage of life can have detrimental effects on the ability to enjoy human interaction and affects quality of life and well-being. As individuals age, age-related decline in hearing and vision occurs, often leading to depression, anxiety, and social isolation as communicating becomes more challenging.[65]

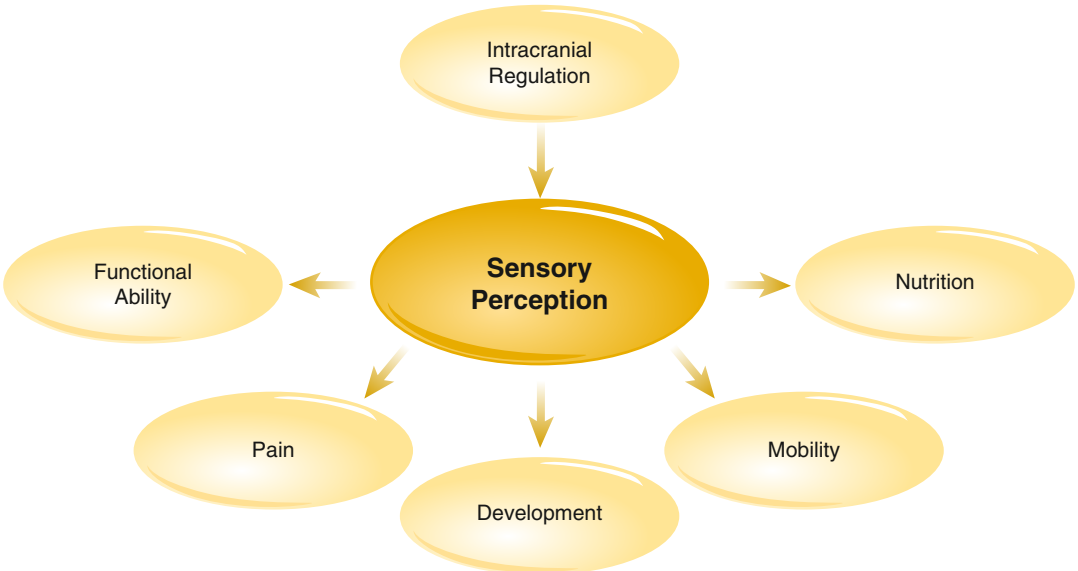


FIG. 26.4 Sensory Perception and Interrelated Concepts.

CLINICAL EXEMPLARS

The concept of Sensory Perception represents the five senses; therefore, a multitude of exemplars exist. Box 26.2 details several exemplars that may occur across the life span. Note that an overlap of one or more acute and/or chronic conditions affecting sensory perception often occurs in one's lifetime. Detailed explanations and the nursing care for these conditions are presented in a variety of medical–surgical, pediatric, and gerontology resources. Brief explanations of several classic conditions are described next.

Featured Exemplars

Presbycusis

Age-related hearing loss, called presbycusis, is typically sensorineural (caused by pathologic changes in the inner ear or in the nerve pathways from the inner ear to the brain) and refers to a decrease in the ability to hear and process sound that is associated with aging and cannot be explained by the patient's genetic history, other diseases, or injury to the auditory system.[66] Presbycusis is present in approximately 19% of individuals 40 to 69 years of age; it is present in 43% of individuals older than age 70 years.[37]

Otitis Media

Otitis media is the second most common illness diagnosed in children. Children younger than 7 years of age are particularly vulnerable because of their immature immune system, and this illness is further complicated by poorly functioning eustachian tubes. Persistent or prolonged otitis media can lead to repeated use of antimicrobial therapy, conductive hearing loss, and associated developmental delay in speech and language. It can also cause disseminated infection, disruption of the tympanic membrane, and the requirement for surgery.[67]

Nasal Polyps

Nasal polyps are known to be associated with several immunologic conditions, infection, and aspirin sensitivity. Although the etiology for the development of nasal polyposis is unclear, the condition appears to be directly related to chronic inflammation in the nose and nasal passages. Patients with nasal polyps frequently experience significant changes in their ability to smell, often leading to partial (hyposmia) or complete loss of smell (anosmia). The presence of nasal polyps is also associated with exacerbation of asthma, or poorly controlled asthma. Treatment is generally with the use of oral or intranasal corticosteroids. Treatment of severe nasal polyposis is often surgical, although recurrence is common.[68]

Meniere Disease

Meniere disease is characterized by episodic unilateral temporary hearing loss often accompanied by ringing (tinnitus) and a sensation of ear fullness or congestion in the affected ear as well as severe dizziness (vertigo). Patients often experience these symptoms in clusters of varying severity and duration with interspersed complete remission. Meniere disease is thought to be caused by a dysfunction of the endolymphatic system in the inner ear, resulting in interference with balance and hearing. Because there is no cure, treatment is focused on symptom control, with low-sodium diet, high-water intake, and avoidance of alcohol, tobacco, and caffeine. [69]

Raynaud Syndrome

Raynaud syndrome is caused by vasospasms of distal arteries and arterioles, resulting in limitation of blood supply, causing the skin to turn white (pallor) and then blue (cyanosis). Patients will experience numbness, prickly feeling, stinging pain, and coldness of the hands and feet, which are generally triggered by a sudden exposure to cold temperature. Raynaud syndrome is more common in individuals who reside in colder climates and occurs more frequently in women. Treatment is primarily cold avoidance, wearing protective clothing, tobacco avoidance, and, if needed, medications to dilate blood vessels and promote circulation.[23]

BOX 26.2 EXEMPLARS OF IMPAIRED SENSORY PERCEPTION

Congenital Exemplars
- Deafness
- Cleft palate/lip
- Structural ear anomalies
- Congenital cataracts
- Retinopathy of prematurity

Visual Exemplars
- Amblyopia
- Blindness
- Presbyopia
- Cataract
- Retinal detachment
- Macular degenerative disease
- Glaucoma

Auditory Exemplars
- Sensorineural hearing loss
- Conductive hearing loss
- Mixed hearing loss
- Neoplasm and cholesteatoma
- Meniere disease

Gustatory Exemplars
- Ageusia
- Hypogeusia
- Dysgeusia
- Burning mouth syndrome

Olfactory Exemplars
- Anosmia
- Hyposmia
- Parosmia
- Phantosmia
- Tobacco use disorder

Somatosensory Exemplars
- Peripheral neuropathy
- Peripheral artery disease
- Raynaud syndrome
- Systemic sclerosis

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

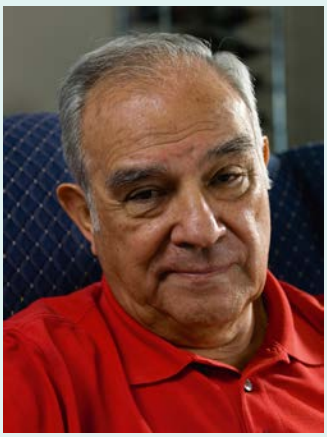
Chemotherapy-Induced Alteration in Taste

The majority of patients who receive chemotherapy experience alterations in taste. These changes can range from a sweet, sour, or bitter taste in the mouth to complete loss of taste perception. Patients also often experience inflammation of the oral mucosa (stomatitis), oral thrush, dry mouth, and other changes associated with cancer treatment. Changes in taste perception occur in approximately 93% of patients receiving chemotherapy and may result in food aversion, subsequent weight loss, and malnutrition.[70] Diminished quality of life and social isolation may occur as a result, further challenging the resolve of the cancer patient.

Diabetic Retinopathy

Diabetic retinopathy is the leading cause of blindness among adults in America.[71] The effects of diabetic retinopathy are often already present in patients diagnosed with type 2 diabetes at age 30 years or older.[71] Diabetic retinopathy is the result of changes to the blood vessels of the retina that occur over time. Patients are often unaware of these changes during the early stages of development; however, as the damage becomes more extensive, vision loss ensues. Prevention is the primary focus of care with good control of blood sugar levels. In addition, pharmacologic treatment and surgical procedures such as laser treatment may be used.[72]

CASE STUDY



From Juanmonino/iStock/Thinkstock.

Case Presentation

Mr. Robert Holton, 74 years old and retired, spent his entire working career as a self-employed carpenter. He has a 22-year history of type 2 diabetes; he also has hypertension and emphysema. He is an active smoker (52-pack-year smoking history), although he has attempted to stop smoking on several occasions. He wears a hearing aid in each ear because of hearing loss as a result of working around machinery for many years.

Robert presents for a routine 3-month visit with the nurse practitioner accompanied by his wife. Mrs. Holton reports that Robert's feet smell very bad, but he does not seem to notice the odor. The nurse practitioner removes Robert's shoes and socks; a large, infected foot ulcer is observed on the bottom of the foot. Robert is surprised that he was unaware of the wound. When asked about other changes, Robert does not respond. Mrs. Holton reports that he recently failed his visual acuity test for driver's license renewal and now must depend on her for transportation. She adds that he has become increasingly withdrawn over the past 6 months and does little to communicate with her or others; he is also not interested in leaving the house. She asks the nurse practitioner if he is depressed.

Case Analysis Questions

1. What risk factors are present in this case that relate to the concept?
2. What sensory and perception impairments are exemplified in this case?
3. Review Fig. 26.4. Which interrelated concepts apply to this case? Are there other interrelated concepts that apply to this case?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 27

Pain

Angela Renee Starkweather

Across the life span, pain is one of the most common reasons people seek health care, a frequent reason for taking medication, and a major cause of disability.[1] In the United States, common chronic pain conditions affect more than 100 million people and cost more than $560 billion annually in direct medical treatment and lost productivity.[2] Although the field of pain management has experienced rapid growth in technology and research during the past several years, pain continues to be undertreated across care settings. Aligned with ethical standards for healthcare professionals regarding the provision of measures to minimize pain and suffering, adequate assessment and management of pain is viewed as a human right.[3] As healthcare professionals who provide 24-hour presence 7 days a week, nurses play an important role in the management of pain and can be instrumental in ensuring their patients receive the best possible pain relief available.

DEFINITION

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage."[4] This definition describes pain as a complex phenomenon with multiple components that affect a person's psychosocial and physical functioning. The accepted clinical definition of pain, which was proposed by Margo McCaffery in 1968, is accepted worldwide and reinforces that pain is a highly personal and subjective experience: "Pain is whatever the experiencing person says it is, existing whenever he says it does."[5] This is why all accepted guidelines consider the patient's report to be the most reliable indicator of pain.[6]

SCOPE

Pain is a universal experience, although each person may experience pain in a different way. Conceptually, pain is a multidimensional symptom that can influence virtually every aspect of a person's life—the physical, psychological, emotional, social, and spiritual realms. The scope of pain as a concept may be viewed as a normal physiologic response to tissue injury or as a pathologic symptom associated with a disease process or alteration of the somatosensory system. Normally, pain serves as a protective mechanism that is meant to alert the brain to potential or actual bodily harm or tissue damage, such as pain that results from an ankle sprain or fractured limb. However, pain that persists after the usual time for healing to take place serves no useful purpose and is viewed as pathologic. The concept of Pain also ranges across several descriptive continuums, including location, intensity, frequency, and duration. In terms of location, pain may be well localized such as in a joint, or widespread, occurring all over the body. The intensity continuum of pain ranges from none to minimal, moderate, and severe pain (Fig. 27.1). The frequency of pain may be intermittent, occurring every few minutes, hourly, or daily with episodes of no pain, or it may be constant without any breaks at all. Pain may be acute, such as pain that occurs directly after an injury and that dissipates with time as the injury heals. However, pain can also be chronic when it is associated with a disease process or when it persists after injury, and may last for months, years, or a lifetime.

NORMAL PHYSIOLOGICAL PROCESS

The sensations that we experience in our body are orchestrated by an eloquent network of cells, fibers, and organs, known as the somatosensory system, which receives, transmits, and interprets sensory information. Specialized sensory receptor cells carry specific types of sensory information (vision, hearing, touch, heat/cold, proprioception, and pain) along different anatomic pathways depending on the information carried.[7] The cells of free nerve endings in the skin and peripheral organs that are somatosensory receptors for the sensation of pain are known as nociceptors. Nociceptors are found in all tissues except the central nervous system (CNS). Tissue injury activates nociceptors to transmit pain information through the somatosensory system, a process known as nociception. When the brain receives and interprets the information as an unpleasant painful sensation, it is known as nociceptive pain, which is a protective mechanism to alert the brain to potential or actual tissue damage. Although nociceptive pain requires

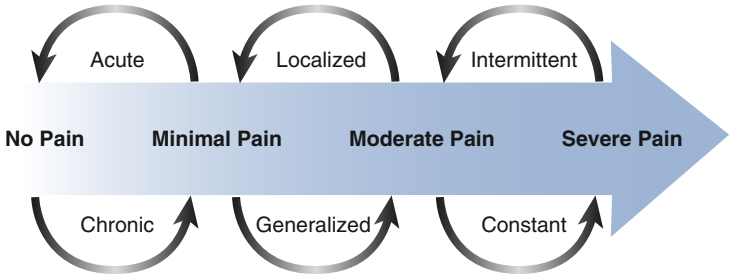


FIG. 27.1 Scope of Pain.

the occurrence of nociception, nociception does not always result in nociceptive pain. The brain has a powerful influence on how we perceive sensory information and may filter or block pain information from awareness, or change our perception of the sensory information. First proposed in 1965 by Melzack and Wall, the gate control theory is considered to be one of the most influential theories of pain because of its focus on a neural basis of pain.[8] The gate control theory asserts that nonnoxious input can close the "gate" to the CNS, thereby preventing painful input from reaching the brain. In this manner, nonpainful stimulation is able to suppress pain. Since that time, it has become well recognized that pain is a complex condition involving numerous areas of the brain and is influenced by emotional, cognitive, and environmental elements.

Neurologic System

Pain is a conscious experience that requires an awareness of sensations via an intact CNS to receive sensory information and interpret the information as an unpleasant and painful sensation. Nociception, or the response of the sensory nervous system to potentially damaging mechanical, thermal, or chemical stimuli, is a physiologic process, whereas pain is a subjective experience. The mechanisms that lead to the perception of nociceptive pain are described here and illustrated in Fig. 27.2.

Transduction

Tissue damage results in the release of chemical mediators from damaged cells that activate nociceptors. These chemical mediators include prostaglandins, bradykinin, serotonin, substance P, and histamine.[7] When the chemical mediators attach to the membrane of the nociceptor, this can result in the opening of sodium channels that activate the nociceptor and cause the generation of an action potential.

Transmission

The action potential subsequently moves from the site of nociceptor activation along specialized afferent nerve fibers that carry pain impulses, known as Aδ and C fibers, to the spinal cord. Aδ fibers are thinly myelinated sensory fibers that send pain impulses faster than unmyelinated C fibers. Due to the myelin covering the Aδ fibers, they are capable of transmitting sharp, stabbing pain sensations, whereas C fibers transmit aching burning-type pain sensations. Substance P and other neurotransmitters allow the action potential to proceed across the cleft to the dorsal horn of the spinal cord, where it ascends the spinothalamic tract to the thalamus and midbrain.

Perception

Fibers from the thalamus send the nociceptive message to the somatosensory cortex, frontal and parietal lobe, as well as the limbic system, where pain is perceived and interpreted based on past experience, beliefs, attitudes, and meaning.

Modulation

Activation of the midbrain results in the release of substances such as endorphins, enkephalins, serotonin, and dynorphin from neurons that descend to the lower areas of the brain and spinal cord, stimulating the release of endogenous opioids that inhibit transmission of pain impulses at the dorsal horn.

Age-Related Differences

The mechanisms of nociceptive pain are normally present at birth and remain functional throughout the adult life span. The presence of acute pain remains approximately the same across the adult life span; however, there is an age-related increase in the prevalence of chronic pain, which affects more than 50% of older persons living in the community and greater than 80% of nursing home residents.[9] Although chronic pain is prevalent among older adults, it is not a normal part of aging. Clinical studies have shown that elderly individuals are more vulnerable to chronic pain and that the ability to tolerate severe pain decreases with age.[10]

VARIATIONS AND CONTEXT

Acute and Chronic Pain

Pain is usually described as being *acute* or *chronic (persistent)*.[4] Acute pain is of sudden onset and is typically clearly linked to a specific event injury or illness. For example, tissue damage as a result of surgery, trauma, or burns produces acute pain, which is expected to be relatively short-lived and to diminish with normal healing. However, there may be variations in the intensity, frequency, and duration of pain between individuals after having the same surgical procedure or injury. This is why the subjective report of pain is so important; the experience of pain is highly individualized. However, when referring to acute pain, it is expected to dissipate with time along with the normal healing process.

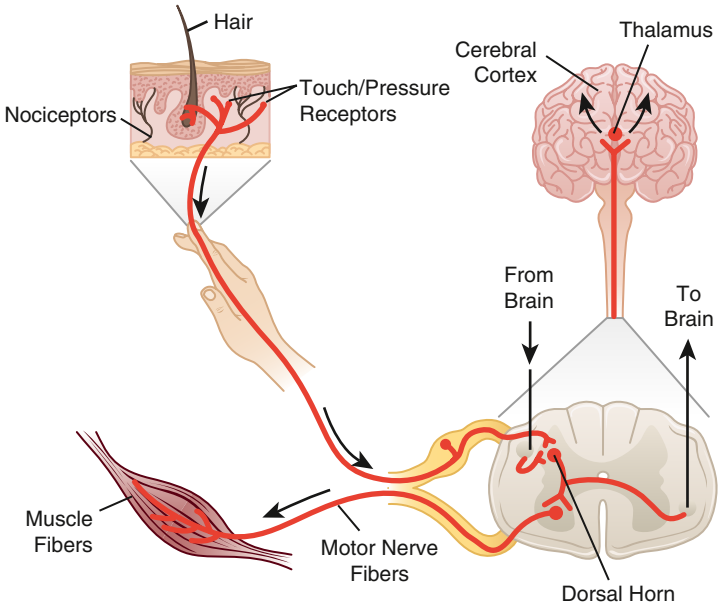


FIG. 27.2 Pain Pathways From the Periphery to the Brain and Back.

In contrast, chronic pain is defined as *pain lasting more than 3 months and that may last for years*.[4] Chronic pain may result from underlying medical conditions (pathology), such as cancer pain from tumor growth or osteoarthritis pain from joint degeneration. Chronic pain may also develop from an injury, medical treatment, inflammation, or unknown causes that alter the somatosensory system, in the periphery, spinal cord, or brain. As an advancement from the gate control theory, which describes the origins of pain, the neuromatrix theory posits that pain is the output of the neural network that is "genetically determined and modified by sensory experience" throughout life.[11] This theory has promoted new thinking about chronic pain conditions, such as fibromyalgia, that do not have an obvious cause but are associated with changes in the CNS. Chronic pain can persist throughout a person's life span and varies in intensity, frequency, and duration. In addition, patients may experience both acute and chronic pain, such as when a patient with chronic cancer pain experiences acute pain after undergoing a painful procedure related to cancer treatment.

Pain Classification

Pain is most often classified by its inferred mechanism as being either *nociceptive pain* or *neuropathic pain*.[4] Nociceptive pain refers to normal functioning of the somatosensory system in response to noxious stimuli (tissue injury) that is perceived as being painful. Simply stated, nociception means "normal" pain transmission. Normal transduction of pain sensation by nociceptors is also known as eudynic pain. Examples of nociceptive pain include pain from a sunburn, surgery, or trauma. Patients often describe this type of pain as "aching," "cramping," or "throbbing." Nociceptive pain may also be categorized as somatic or visceral. Somatic pain is characterized as sharp pain that is well localized to a specific area of injury. Visceral pain arises from within the body cavity, most commonly the thorax, abdomen, and pelvis. Pain receptors in the visceral cavities respond to stretching, swelling, and oxygen deprivation, and the pain may radiate to other locations in the back or chest.

Although the normal mechanisms of nociceptive pain occur from stimulation of nociceptors, pain may also occur as neuropathic pain, which results from a pathology or disease of the somatosensory system.[4] Simply stated, neuropathic pain is pathologic. Examples of neuropathic pain include postherpetic neuralgia, diabetic neuropathy, phantom pain, complex regional pain syndrome, trigeminal neuralgia, and poststroke pain syndrome. Patients with neuropathic pain use very distinctive words to describe their pain, such as "burning," "sharp," and "shooting." Other forms of neuropathic pain are described by the mechanism involved. Sympathetically mediated pain is accompanied by evidence of edema, changes in skin blood flow, and abnormal sensations such as allodynia, hyperalgesia, and hyperpathia. Deafferentation pain is chronic and results from the loss of afferent input to the CNS. The pain may arise in the periphery from a peripheral nerve avulsion or in the CNS from spinal cord lesions or multiple sclerosis. Neuralgia pain is lancinating and associated with nerve damage or irritation along the distribution of a single nerve. Central pain arises from a lesion in the CNS, usually involving the spinothalamic cortical pathways, such as a thalamic infarct. The pain is usually constant with a burning, electrical quality. It is exacerbated by activity, and hyperesthesia and hyperpathia and/or allodynia are usually present.

Some patients have a combination of nociceptive and neuropathic pain. For example, a patient may have nociceptive pain as a result of a peripheral tumor that is growing and activates nociceptors around actual tissue damage; if the tumor is pressing against a nerve plexus, the patient may also report radiating sharp and shooting neuropathic pain. Some painful conditions and syndromes are not easily categorized and are thought to be unique with multiple underlying and poorly understood mechanisms. These are referred to as *mixed pain syndromes* and include fibromyalgia and some low back and myofascial pain.

CONSEQUENCES

Pain triggers a number of physiologic and psychosocial responses and can produce a cascade of harmful effects in all body systems.

Physiologic Consequences

The stress response causes the endocrine system to release excessive amounts of hormones, such as cortisol, catecholamines, and glucagon. Insulin and testosterone levels decrease. Increased endocrine activity in turn initiates a number of metabolic processes, particularly accelerated carbohydrate, protein, and fat destruction (catabolism), which can result in weight loss, tachycardia, increased respiratory rate, shock, and even death.[12] The immune system is also affected by pain, as demonstrated by research showing a link between unrelieved pain and a higher incidence of nosocomial infections and increased tumor growth.[13]

Unrelieved pain affects the respiratory system, causing small tidal volumes and decreases in functional lung capacity, which can lead to pneumonia, atelectasis, and an increased need for mechanical ventilation. Effects on the cardiovascular system include increased postoperative blood loss and hypercoagulation, which can lead to myocardial infarction and stroke. Increased heart rate and blood pressure are autonomic responses to acute pain.

Pain can affect a patient's level of physical functioning. When pain is experienced with movement or mobility, the patient may associate the movement with pain. In this situation, it is very important for patients to understand that nonuse of the affected area and immobility can lead to muscle atrophy and joint contraction, which further promotes pain and impairs physical functioning. Sympathetic nervous system activation caused by acute pain decreases the release of digestive enzymes in the gastrointestinal tract and slows peristalsis. When mobility is not restored after surgery or trauma, this can further impair gastrointestinal function. In turn, many opioid medications used to treat pain can cause constipation, making it necessary to have routine stool softeners along with the opioid medications. The use of opioids, even when prescribed and taken as directed, can lead to abuse, misuse, and addiction in some people. Vigilant screening and assessment of substance use disorders and follow-up of patients on opioids is necessary to ensure that addiction is properly managed.

Psychosocial Consequences

Along with the array of physical consequences that can develop due to pain, chronic pain in particular may be associated with significant psychological and social consequences, including fear, anger, depression, anxiety, and reduced ability to maintain relationships, engage in normal activities, and continue to work.[13] Pain that does not dissipate with normal healing, and pain that is undertreated or untreated, can have a negative effect on nearly every aspect of a person's life and result in psychological and social consequences. Psychosocial consequences of pain treatment with opioids can include opioid use disorder, characterized by an overwhelming urge to use opioids even when they are no longer medically necessary to treat pain. Addiction can affect every aspect of a person's life, including their relationships, employment, and economic status.

RISK FACTORS

With rare exception, everyone experiences pain at some point during the course of their lifetime. However, some population groups and individuals are at higher risk of experiencing severe or unrelieved pain than others.

Populations at Risk

Infants and Children

Neonates are at risk for pain, primarily from procedures such as heel sticks, venipuncture, and circumcision.[14] Critically ill infants are at very high risk for pain due to the high number of procedures performed. In the neonatal intensive care unit, sick neonates are commonly exposed to numerous painful procedures, including endotracheal intubation and suctioning, insertion of chest tubes, and arterial and venous punctures. Infants, toddlers, and developmentally preverbal children do not have the cognitive skills to report and describe pain; thus, other indicators besides self-report must be used to recognize and treat pain.

Older Adults

Although not all older adults experience pain, the incidence of pain increases with age, placing this population at higher risk for pain than younger individuals. Pain has been shown to be very common in the older adult in the inpatient acute care setting and in the outpatient setting, such as nursing homes.[9] This is in large part because older adults suffer many of the conditions associated with pain, including musculoskeletal disorders such as degenerative spine conditions and arthritis. They are frequent recipients of surgical procedures and at increased risk of injury from falls and trauma, all of which can result in pain. Some pain syndromes, such as postherpetic neuralgia, poststroke pain, and diabetic neuropathy, are more prevalent in the older population. Cancer is more common in older adults than in younger adults, and as many as 80% of cancer patients experience pain as a consequence of the disease process, as well as its treatment. The older adult is at high risk for undertreatment of pain as well. Many are reluctant or unable to report their pain because of illness or cognitive impairment. Research shows that clinicians fail to provide adequate analgesia based on the misconception that analgesics are not needed or fears that analgesics may cause adverse effects, such as confusion and respiratory depression.[10]

Other Population Groups

Other risk factors for pain or undertreatment of pain include sex, race, and ethnicity.[15] Across settings, women report a higher prevalence of chronic pain than men, which may relate to the various chronic pain syndromes that occur exclusively or predominantly in women, such as endometriosis and fibromyalgia. In experimental studies, women report lower pain thresholds (the amount of stimulus at which pain begins to be felt) and less tolerance for pain (the maximum level of pain that a person can tolerate). Such gender differences are linked in part to hormone levels. Social factors that have an influence on access to pain treatments include income, education, and geographic location. Cultural and/or religious convictions may pose a barrier to reporting pain. Clinician bias and systematic barriers to

receiving proper assessment and adequate pain management are often experienced by racial, ethnic, sexual and gender minorities, which increases their risk of unresolved pain.[16] In addition, as a population group, military veterans have increased vulnerability to pain due to the high risk of combat-related injury or trauma.[17]

Individual Risk Factors

A number of individual risk factors exist that place individuals at greater risk for experiencing pain, or risk for having insufficient pain relief, including communication barriers, genetic predisposition, cognitive impairment, substance use, individuals who have sustained significant injury, and those suffering from conditions that are known to cause pain.

Communication Barriers

Regardless of age, anyone who cannot report pain is at risk for undertreatment of pain. These individuals are referred to as *nonverbal* and include infants, toddlers, the cognitively impaired, and anesthetized, critically ill, comatose, and imminently dying patients. Patients who speak a different language may not understand the questions asked by healthcare providers and may lack the ability to adequately describe their pain experience. Furthermore, they may exhibit behavioral responses to pain differently, and these cues may be missed or misinterpreted by nurses from different cultural backgrounds.

Cognitive Impairment or Developmental Disability

The prevalence and burden of pain is higher in cognitively impaired or developmentally disabled children and adults compared with healthy individuals. Although a majority of individuals with cognitive impairment or developmental disability are verbal and can use a self-report pain assessment tool, behavioral pain tools should be used as well for initial and ongoing assessments.

Mental Health Conditions

Patients with a history or current use of illicit substances may be perceived as trying to obtain pain medication as part of their addiction. However, individuals with addictive disease also experience pain, and their report of pain should be addressed through multimodal therapies.[3] Mental illness is a common comorbidity with chronic pain. A preexisting psychiatric illness may affect pain severity. In addition, patients with chronic pain may develop depression or anxiety disorders, particularly when they feel powerless or view their condition as hopeless. When patients present with mental illness and pain, both conditions should be addressed.

Injury or Conditions Associated with Pain

Some of the most obvious risk factors for pain are traumatic injury, critical illness, surgical procedures, or other conditions associated with pain. Acute and chronic medical conditions that are classically associated with severe pain include fractures, cluster headaches, passing kidney stones, trigeminal neuralgia, pancreatitis, shingles, herniated disc, and late stages of cancer. Critically ill patients of all ages experience a significant amount of pain from underlying painful pathologic conditions and the repetitive painful procedures to which they are exposed during the course of care. Research has shown that the most painful procedure in the intensive care unit is turning,[18] which underscores the high prevalence of pain in the critical care setting.

ASSESSMENT

In a national agenda for improving pain assessment and management, The Joint Commission emphasized the need for frequent assessment and reassessment of pain.[1] More recently, the U.S. Department of Health and Human Services (DHHS) and Centers for Disease Control and Prevention (CDC) published recommendations for assessment and management of pain along with guidelines for opioid prescribing, which include routine assessment for actual or potential substance use disorders.[19] Precise and systematic assessment is required to determine the areas affected by pain, likely contributing factors, and most effective treatment plan for patients who present with pain. In addition, the location and description of pain can serve as a diagnostic clue to underlying pathology.[20]

History

The past medical history should be obtained, including relevant health conditions that may affect pain, past surgeries and injuries, psychiatric illnesses and chemical dependence, and prior problems with pain and treatment outcomes. Current stressors that the patient is facing can also help identify psychosocial issues affecting the pain. The health of family members and family history of pain or illness should be obtained.

Examination Findings

Along with the pain assessment, a standard pain examination includes components of a neurologic (sensory, reflexes) and musculoskeletal (range of motion, strength) assessment that is tailored to the areas of the body affected.

Conducting a Pain Assessment

The gold standard of pain assessment is the patient's subjective report of the pain experience.[5] A thorough pain assessment is obtained by asking the patient a number of questions, and it serves as the foundation for effective pain management. It is used to establish the initial treatment plan and determine when changes are needed.[20] The components of a comprehensive pain assessment are presented here.

Location(s) of Pain

Ask the patient to point to the area(s) of pain on the body.

Intensity

Ask the patient to rate the intensity of pain using a reliable and valid pain assessment tool. A number of scales in several language translations have been evaluated and made available for use in clinical practice and for educational purposes. The following scales are most commonly used:

- *Numeric rating scale (NRS):* The NRS is most often presented as a horizontal 0- to 10-point scale, with word anchors of "no pain" at one end of the scale, "moderate pain" in the middle of the scale, and "worst possible pain" at the end of the scale.

- *Faces Pain Scale–Revised (FPS-R):* The FPS-R has six faces to make it consistent with other scales using the 0 to 10 metric. The faces range from a neutral facial expression to one of intense pain and are numbered 0, 2, 4, 6, 8, and 10. Patients are asked to choose the face that best describes their pain. The FPS-R is valid and reliable for use in children and adults, including cognitively intact and impaired elders.[21] Although young children may be able to select a face on a faces scale, they are unable to optimally quantify pain (identify a number) until approximately 8 years of age.[22]
- *Wong–Baker FACES Pain Rating Scale:* The FACES scale consists of six cartoon faces with word descriptors, ranging from a smiling face on the left for "no pain (no hurt)" to a frowning, tearful face on the right for "worst pain (hurts worst)." The faces are most commonly numbered using a 0, 2, 4, 6, 8, 10 metric; however, 0 to 5 can also be used. Patients are asked to choose the face that best describes their pain. The FACES scale is used in adults and children as young as age 3 years.[23]
- *Verbal descriptor scale (VDS):* A VDS uses a series of different words or phrases to describe the intensity of pain, such as "no pain," "mild pain," "moderate pain," "severe pain," "very severe pain," and "worst possible pain." The patient is asked to select the phrase that best describes his or her pain intensity. The scale can be presented horizontally or vertically and can be helpful for patients with difficulty using a numeric scale.

Quality

Ask the patient to describe how the pain feels. Descriptors such as "burning" or "shooting" may identify the presence of neuropathic pain.

Onset and Duration

Ask the patient when the pain started, what activities he or she was performing when it began, as well as whether it is constant or intermittent.

Alleviating and Relieving Factors

Ask the patient what makes the pain better and what makes it worse. The answers help determine which pain medications and nonpharmacologic interventions are effective and which are not.

Effect of Pain on Function and Quality of Life

Ask the patient to describe medication side effects (e.g., constipation, nausea, and sedation) and difficulty sleeping or eating. Assess for comorbidities, such as anxiety and depression. It is particularly important to ask patients with chronic pain how pain has affected their lives; ask what they could do before the pain began that they can no longer do, or what they want to do but cannot do because of the pain.

Comfort–Function (Pain) Goal

Discuss the expectation of functional goal achievement. For example, tell surgical patients that they will need to deep breathe, cough, turn, and ambulate or participate in physical therapy after surgery. Patients with chronic pain can be asked to identify their unique functional or quality-of-life goals, such as being able to work, walk the dog, or garden. Ask the patient to identify (using a 0 to 10 scale) a level of pain that will allow accomplishment of the identified functional or quality-of-life goals with reasonable ease. A realistic goal for most patients is 2 or 3, and pain intensity ratings that are consistently above the goal warrant further evaluation and consideration of an intervention and possible adjustment of the treatment plan.[20]

Breakthrough Pain

An important part of the pain assessment is to determine whether the patient is experiencing *breakthrough pain* and if its treatment is effective. Breakthrough pain (also called *pain flare*) is a transitory exacerbation of pain in a patient who has relatively stable and adequately controlled baseline pain. When breakthrough pain is brief and precipitated by a voluntary action, such as movement, it is referred to as *incident pain.* Another type of breakthrough pain called *idiopathic pain* is not associated with any known cause and often lasts longer than incident pain. Episodes of pain that occur before the next analgesic dose is due are called *end-of-dose failure pain.* A fast-onset, short-acting formulation of a first-line analgesic, such as morphine, oxycodone, hydromorphone, or fentanyl, is used to manage breakthrough pain. Analgesic doses or the frequency of their administration is adjusted as needed to minimize the occurrence of breakthrough pain.

Reassessment

Following initiation of the pain management plan, pain is reassessed and documented on a regular basis as a way to evaluate the effectiveness of the treatments. At a minimum, pain should be reassessed with each new report of pain and before and after the administration of analgesics.[24] The frequency of reassessment depends on the stability of the patient's pain and is guided by institutional policy. For example, in the acute care hospital setting, reassessment may be necessary as often as every 10 minutes when pain is unstable during the titration phase (gradual increases in dose to establish analgesia) and every 8 hours in patients with stable pain. Findings that warrant further evaluation or notification of the prescriber include pain ratings that continue to be higher than the patient's comfort–function goal, a change in the location or quality of pain, and the development of medication-induced side effects that do not respond to treatment. Nurse monitoring of side effects is essential to ensure patient safety during analgesic administration. Life-threatening opioid-induced respiratory depression is the most serious of the opioid side effects; however, nurses can be key to preventing this complication by performing systematic assessments of their patients' sedation levels.[25] Less opioid is required to produce sedation than to produce respiratory depression, a characteristic that makes sedation a particularly sensitive indicator of impending respiratory depression. Gradual increases in sedation level warrant prompt reduction of opioid dose and increased frequency of nurse monitoring until the patient demonstrates an acceptable level of sedation.[26]

Challenges in Assessment

Many patients are unable to provide a report of their pain because they are cognitively impaired or too young (infants and small children) to use customary self-report pain assessment tools. Other patients who present challenges in pain assessment are the critically ill (intubated and unresponsive) and those who are receiving neuromuscular blocking agents or are sedated from anesthetics and other drugs given during surgery. All of these patients are collectively referred to as "nonverbal" patients.[27]

When patients are unable to report pain using traditional methods, an alternative approach based on the Hierarchy of Importance of Pain Measures is recommended.[28] The key components of the hierarchy are to (1) attempt to obtain self-report, (2) consider underlying pathology or conditions and procedures that might be painful (e.g., surgery), (3) observe behaviors, (4) evaluate physiologic indicators, and (5) conduct an analgesic trial.

Diagnostic Tests

Diagnostic tests, such as x-rays, computed tomography, magnetic resonance imaging, or ultrasound, may be used to examine the areas of pain to identify a potential etiology. However, these should not delay appropriate treatment of pain.

CORE COMPETENCIES

Pain

- Integrate evidence-based knowledge from nursing and other sciences as it relates to pain.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to pain.
- Synthesize assessment data in the context of the individual's current preferences, situation, and experience regarding pain.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to pain for individuals, communities, or populations.
- Consider individual beliefs, values, and personalized information in communication about pain and pain management.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to pain.
- Using a person-centered approach, educate individuals and families regarding self-care for pain management.
- Demonstrate cultural sensitivity and humility in the practice of pain management.
- Demonstrate clinical judgment founded on broad knowledge of pain and pain management.

CLINICAL MANAGEMENT

For most of the health and illness concepts presented in this text, clinical management includes all phases of health promotion, including primary and secondary prevention. Prevention of pain entails injury prevention strategies as well as maintaining good posture, musculoskeletal health, adequate sleep, physical activity, and nutrition. Routine screening for pain should be performed, regardless of the patient's condition(s) or appearance, by inquiring about the presence of pain and severity level. However, for the concept of Pain, the relevant focus of clinical management involves interventions to treat pain.

Collaborative Interventions

Pharmacologic Strategies

Because pain is a complex phenomenon involving multiple underlying mechanisms, a multimodal regimen, which combines drugs with different underlying mechanisms, is often indicated. This allows lower doses of each of the drugs in the treatment plan, thereby reducing the potential for adverse effects and can result in comparable or greater pain relief than can be achieved with any single analgesic.[29] Guidelines recommend the use of multimodal analgesia for all types of pain.[30–33] In addition, every patient encounter provides an opportunity to assess for substance abuse disorders and reevaluate the need for prescription analgesics.[19]

Analgesics. There are three major analgesic groups:

- Nonopioid analgesics
- Opioid analgesics
- Adjuvant analgesics

Fig. 27.3 shows the first-line analgesics in each group.

Nonopioid analgesics are appropriate alone for mild to some moderate nociceptive-type pain and are added to opioid analgesics as part of a multimodal analgesic regimen for more severe nociceptive pain.[34] For example, unless contraindicated, all surgical patients should routinely be given acetaminophen and a nonsteroidal antiinflammatory drug (NSAID) in scheduled doses throughout the postoperative course. Opioid analgesics are added to the treatment plan to manage moderate to severe postoperative pain.[29] A local anesthetic is sometimes administered epidurally or by continuous peripheral nerve block. An anticonvulsant may be added to the treatment plan as well to control severe pain or prevent a chronic postsurgical pain syndrome, such as postthoracotomy or postmastectomy pain.[35]

Anticonvulsants and antidepressants are first-line analgesics for neuropathic pain.[31] These analgesics require a period of several days to weeks of dose titration to determine efficacy and safety and to achieve adequate pain control. Lidocaine patch 5% is used for well-localized peripheral neuropathic types of pain, such as postherpetic neuralgia (shingles-related pain). Long-term opioid therapy can be effective for improving function in some individuals with chronic pain, however, the risks of opioid addiction or overdose should be discussed with the patient and family, with appropriate monitoring in place to identify and treat substance abuse dsorders.[19] It is not unusual to find a multimodal pain treatment regimen for a person with neuropathic pain that includes an antidepressant, anticonvulsant, local anesthetic, and an analgesic.

Routes of administration. A variety of routes of administration is used to deliver analgesics. A principle of pain management is to use the oral route of administration whenever feasible.[29] All of the first-line analgesics used to manage pain are available in short-acting and long-acting formulations. For patients who have continuous pain in the hospital setting, a long-acting analgesic, such as modified-release oral morphine, oxycodone, hydromorphone, or transdermal fentanyl, is used to treat the persistent baseline pain. A fast-onset, short-acting

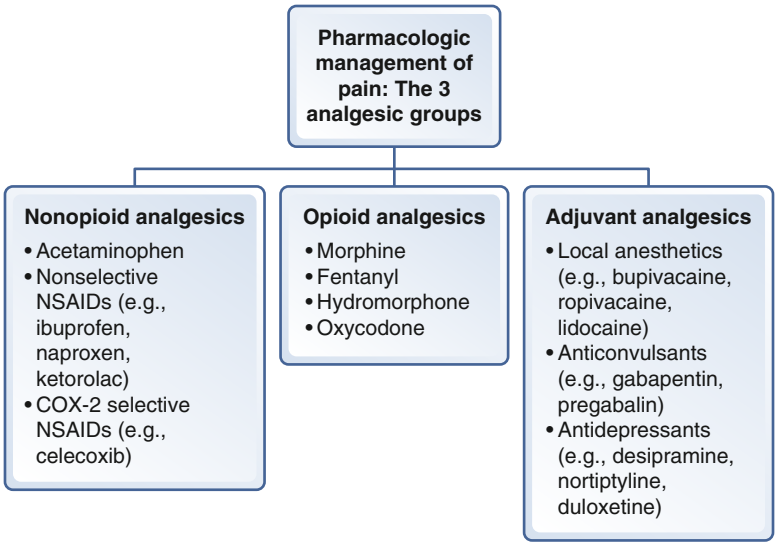


FIG. 27.3 Pharmacologic Management of Pain. *COX,* Cyclooxygenase; *NSAIDs,* nonsteroidal anti-inflammatory drugs. This figure shows the three analgesic groups and examples of first-line options within each group.

analgesic (usually the same drug as the long-acting) is used to treat breakthrough pain if it occurs.[29]

When the oral route is not possible, other routes of administration are used, including intravenous (IV), subcutaneous, transdermal, and rectal. Opioids are often given by IV patient-controlled analgesia (PCA). Patients who use PCA must be able to understand the relationships between pain, pushing the PCA button, and pain relief. They must also be able to cognitively and physically use the PCA equipment.[29] Other routes for pain administration include intraspinal analgesia and continuous peripheral nerve block infusions with or without PCA capability. Nurses play a key and extensive role in the successful management of these therapies, and the American Society for Pain Management Nursing (http://aspmn.org) provides guidelines for care.[27] As more information is gathered regarding how genetic factors influence the metabolism of medications used to treat pain and the side effects produced, a more patient-centered pain management approach may be used.[14]

For patients with pain who are being discharged or treated in the outpatient setting, nonpharmacologic and nonopioid therapies are preferred and it is important to establish treatment goals, discuss the risks and benefits of opioid use, and discuss patient and provider responsibilities if opioids are prescribed.[29] Prior to providing an opioid prescription, the state's prescription drug monitoring program should be checked to identify any recent or overlapping opioid prescriptions. Along with a thorough medical and social history and physical exam to evaluate the risk of opioid use disorder, urine toxicology may be used to assess for substance use. As with all opioids, avoid concurrent prescriptions of benzodiazepines to reduce the risk of opioid overdose, and ensure that the patient is prescribed immediate release (not long-acting) formulations at the lowest effective dose and at no greater quantity than needed—typically for less than 3 to 7 days for those initiating opioid therapy.[30] Patients who are identified as having opioid use disorder should be offered appropriate treatment with buprenorphine or methadone, or referred for treatment of substance use disorder.

Invasive or Surgical Strategies

Regional anesthetic strategies for pain management include epidural steroid injections to treat radicular pain, joint injections, nerve blocks, and implantation of intrathecal analgesic delivery systems. More invasive measures may include spinal cord stimulators, rhizotomy or neurectomy, nerve decompression, and joint replacement therapies. These invasive procedures are typically performed after other treatment modalities have failed to provide pain relief.

Nonpharmacologic Strategies

Nonpharmacologic strategies encompass a wide variety of nondrug treatments that may contribute to comfort and pain relief. These include the body-based (physical) modalities, such as massage, acupuncture, and application of heat and cold, and the mind–body methods, such as guided imagery, relaxation breathing, and meditation. In addition, psychological therapies such as cognitive–behavioral therapy, biofeedback, and hypnosis may be used along with other strategies to help manage pain. There are also biologically based therapies, which involve the use of herbs and vitamins, and energy therapies such as reiki and tai chi.[13]

Nonpharmacologic methods may be effective alone for mild to some moderate-intensity pain and are used to complement, but not replace, pharmacologic therapies for more severe pain. The effectiveness of nonpharmacologic methods can be unpredictable, and although not all have been shown to relieve pain, they offer many benefits (such as facilitating relaxation and reducing stress) to patients with pain. Many patients find that the use of nonpharmacologic methods helps them cope better with their pain and feel greater control over the pain experience. The following list provides examples of nonpharmacologic measures that are noninvasive and relatively easy to incorporate

into daily clinical practice. They can be used individually or in combination with other nondrug therapies:

- Proper body alignment achieved through proper *positioning* and regular repositioning can help prevent or relieve pain. Pillows can be used to maintain the position and support the patient's back and extremities.
- Thermal measures such as the *application of localized, superficial heat and cooling* may relieve pain and provide comfort by decreasing sensitivity to pain and muscle spasms, and alleviating joint and muscle aches. The two measures are often used interchangeably.
- *Mind–body therapies* are designed to enhance the mind's capacity to affect bodily function and symptoms and include, but is not limited to, music therapy, distraction techniques, meditation, prayer, hypnosis, guided imagery, relaxation techniques, and pet therapy.

CLINICAL NURSING SKILLS FOR PAIN

- Pain assessment
- Nonpharmacologic pain management
- Massage
- Splinting
- Relaxation and guided imagery
- Distraction
- Pharmacologic pain management
- Oral medications
- Intravenous medications
- Epidural analgesia
- Patient-controlled analgesia
- Local anesthesia

INTERRELATED CONCEPTS

Pain is connected to numerous concepts, with those considered more relevant listed here. These are presented in Fig. 27.4.

The expression and interpretation of pain varies widely across cultural groups; thus, **Culture** is an important interrelated concept. Having an awareness of such differences is critical for nurses so that an accurate pain assessment can be conducted and appropriate pain interventions can be implemented. An individual's level of **Development** impacts how pain is interpreted by the individual and the ability of that individual to communicate his or her pain. Nociceptive pain is typically associated with altered **Tissue Integrity**. Acute pain associated with compromised tissue integrity is expected to dissipate with the normal healing process. **Mobility** is an important interrelated concept because severe pain can be immobilizing to individuals, and, in fact, some of the most disturbing effects of unrelieved pain are seen in the musculoskeletal system with impaired muscle, skeletal, or joint function. Inadequately managed pain can affect **Functional Ability**. This is often seen in the postoperative setting where the patient's ability to ambulate and participate in important physical therapy activities prolongs recovery and is associated with a higher incidence of complications including long-term disability. In the outpatient setting, individuals with poorly managed chronic pain report inability to complete even the simplest of activities of daily living, which can result in loss of independence and greater reliance on family, friends, and the healthcare system. Patients with poorly managed chronic pain frequently report **Sleep** disturbances, and sleep disturbances can contribute to increased pain perception, as well as a reduced ability to cope with pain. Pain also leads to **Fatigue**, particularly when sleep is impaired. Increased levels of fatigue along with pain can further impair mobility and functional ability. Pain also affects **Mood and Affect**. Patients with severe pain are more likely to rate their general health as poor and describe having suicidal thoughts. Research has even shown that severe chronic pain is associated with increased mortality, independent of sociodemographic factors such as income, age, and gender.[35] As discussed, the experience of pain varies for each individual and is influenced by many factors. Thus, **Person-Centered Care** is a critical interrelated concept that focuses on integrating the person's beliefs, values, and preferences, into an individualized pain management plan.

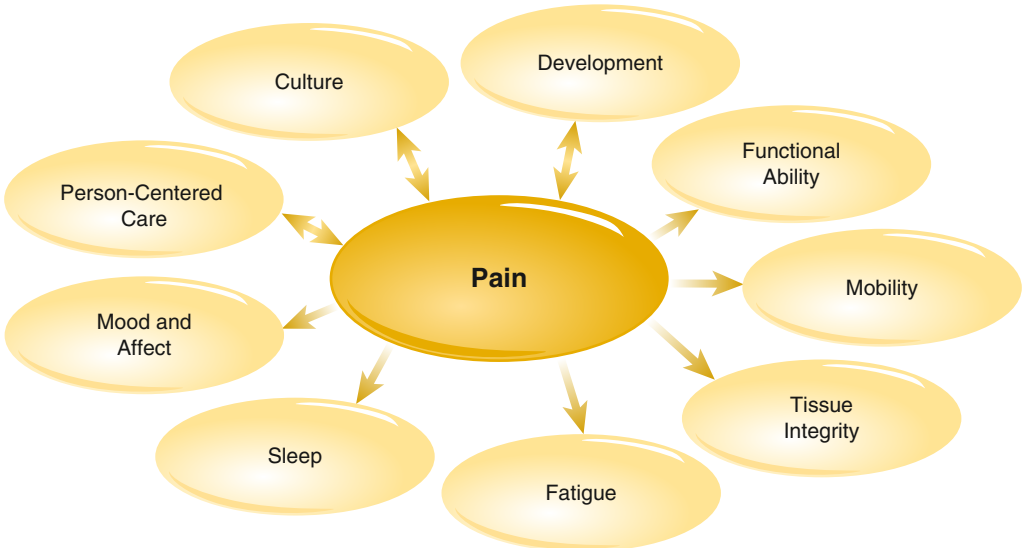


FIG. 27.4 Pain and Interrelated Concepts.

CLINICAL EXEMPLARS

As mentioned previously, most individuals experience pain across the life span and in many different ways. Thus, the nurse will encounter multiple situations that will require pain assessment and interventions. A discussion of each situation is beyond the scope of this concept analysis; however, Box 27.1 presents the most common pain conditions in the context of the major categories of pain.

BOX 27.1 EXEMPLARS OF PAIN

Nociceptive Pain

Somatic Pain

- Ankylosing spondylitis
- Cancer pain (tumor growth) and pain associated with bony metastases
- Labor pain (cervical changes and uterine contractions)
- Osteoarthritis pain
- Osteoporosis pain
- Pain of Ehlers–Danlos syndrome
- Rheumatoid arthritis pain
- Surgical trauma/postoperative pain
- Pain from traumatic injuries
  - Wounds
  - Burns
  - Fractures
  - Deep tissue bruising

Visceral Pain

- Crohn disease
- Irritable bowel syndrome
- Organ-involved cancer pain
- Pancreatitis
- Ulcerative colitis

Neuropathic Pain

Centrally Generated Pain

- Complex regional pain syndrome
- Pain following spinal cord injury
- Phantom pain as a result of peripheral nerve damage
- Poststroke pain

Peripherally Generated Pain

- Alcohol–nutritional neuropathy
- Diabetic neuropathy
- Nerve root compression, nerve entrapment
- Pain of Guillain–Barré syndrome
- Postherpetic neuralgia
- Some types of neck, shoulder, and back pain
- Trigeminal neuralgia

Mixed Pain

- Fibromyalgia
- Myofascial pain
- Pain associated with HIV
- Pain associated with Lyme disease
- Some headaches
- Some types of neck, shoulder, and back pain

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Featured Exemplars

Osteoarthritis Pain

Osteoarthritis is a condition that causes the cartilage in a joint to become stiff and lose elasticity. As this occurs, the cartilage can wear away, causing tendons and ligaments to stretch and bones to rub against one another, resulting in pain. Osteoarthritis commonly affects the hands as well as weight-bearing joints and is more frequent in women than in men. Osteoarthritis pain is an example of nociceptive, somatic pain.

Trigeminal Neuralgia

Also known as tic douloureux, trigeminal neuralgia is a form of neuropathic pain arising from the trigeminal (fifth) cranial nerve. It causes extreme, sporadic burning or shock-like facial pain that can last seconds to minutes per episode. The intensity of pain can be physically and mentally incapacitating.

Postherpetic Neuralgia

Another type of neuropathic pain is postherpetic neuralgia, which develops after a case of shingles caused by the herpes zoster virus. Typically, thin blisters associated with shingles disappear within a few weeks, but when the pain continues after the blisters have disappeared, the burning pain is known as postherpetic neuralgia. The incidence of postherpetic neuralgia increases with age.

Poststroke Pain

More than half of all stroke survivors report some form of poststroke pain. It can occur immediately following a stroke or weeks to months afterward and may affect any area of the body. Patients typically describe burning pain or unpleasant and painful "pins-and-needles" sensation.

Complex Regional Pain Syndrome

Complex regional pain syndrome (CRPS) is a form of neuropathic pain that affects one of the limbs (arm, leg, hand, or foot) after an injury or trauma of the limb. CRPS is characterized by prolonged or excessive pain and mild to dramatic changes in skin color, temperature, and swelling of the affected area. It is more frequent in women.

Fibromyalgia

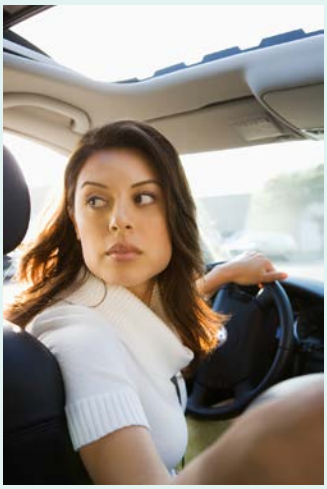
Fibromyalgia is a mixed pain disorder that is associated with widespread musculoskeletal pain, fatigue, sleep disturbances, and cognitive and mood disorders. Symptoms often begin after physical trauma, surgery, infection, or significant psychological stress and accumulate over time. Fibromyalgia is more common in women.

Phantom Pain

Phantom pain feels like it is coming from a body part that is no longer there. Although phantom pain most often develops after removal of an arm or a leg, with up to 75% of patients

developing pain within the first few days after limb amputation, it can also occur after removal of other body parts. Many factors are thought to influence the risk of phantom pain, particularly preamputation pain and genetic factors; however, phantom pain is thought to originate in the brain. Multimodal therapies are often required to reduce pain, although most patients experience a decrease in pain over time.

CASE STUDY



From Siri Stafford/Digital Vision/Thinkstock

Case Presentation

Jenny Alvers is a 38-year-old otherwise healthy female who has been admitted directly to the intensive care unit (ICU) after an automobile accident and emergency abdominal surgery. In addition to surgery, she has deep face, neck, and chest lacerations and contusions. Jenny is on a ventilator and somewhat disoriented and restless with elevated blood pressure and heart rate. She is unable to provide a report of pain, but based on her pathologic condition, the nurse assumes that Jenny has pain and consults with the surgeon about orders for a continuous IV opioid infusion. Knowing that Jenny will be subjected to painful procedures such as endotracheal suctioning and wound care during her stay in the ICU, the nurse also requests supplemental IV opioid doses to administer prophylactically. Jenny's sister reported that Jenny has no allergies but experienced severe nausea when she was given IV morphine following an appendectomy 3 years ago. The surgeon prescribes an IV infusion of hydromorphone at a dosage appropriate for an adult with moderate to severe pain and supplemental IV hydromorphone bolus doses every hour as needed. Scheduled doses of IV acetaminophen and IV ibuprofen are also ordered.

The nurse suspects that Jenny's restlessness could be related to unrelieved pain and, therefore, administers an IV hydromorphone loading dose before initiating the infusion. Infusions of IV ibuprofen followed by IV acetaminophen are also administered. An aqua pad circulating cool water is placed over Jenny's chest to provide additional analgesia. The nurse reduces the external stimuli in the room as much as possible and provides Jenny with calm reassurance and orientation while caring for her. Within 45 minutes of these interventions, Jenny is no longer restless, her vital signs are within normal limits and stable, and she appears to be resting comfortably.

Case Analysis Questions

1. What factors place Jenny at high risk for inadequate pain relief?
2. What methods should be used now, and in the future, to assess Jenny's pain?
3. What type of pain is Jenny most likely experiencing? How does this information affect treatment decisions?

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CONCEPT 28

Fatigue

Jean Foret Giddens

Fatigue is a physiologic phenomenon experienced by all individuals across the life span and populations. Fatigue represents an expected physiologic outcome of physical, cognitive, or emotional exertion and it can also represent a life-altering symptom. Persistent fatigue can significantly impact a person's school or work performance and affect family and social relationships. Fatigue can become so pervasive in a person's life that it can impair their ability to care for themselves (physically and emotionally) resulting in a decreased quality of life. It can also be a contributory factor in accidents and errors. Despite its pervasive nature and prevalence, fatigue has traditionally failed to elicit the same level of attention from healthcare professionals as symptoms such as pain. As such, the scientific knowledge of fatigue, pathogenesis, techniques for assessment, and treatment are not as well developed. Nurses can play a pivotal role in early recognition of this detrimental problem and initiation of care management strategies to mitigate its effects.

DEFINITION

Although fatigue is one of the most common symptoms experienced by humans, there is no single widely accepted definition. On a very basic level, fatigue can be described as feeling tired or exhausted from a physical, cognitive, and/or emotional perspective. However, in the context of health care, this simple definition is insufficient to capture the extent to which fatigue can interfere with overall health. Thus, it is important to differentiate *feeling tired*, which can be relieved by sleep and rest, and *fatigue*, which is not simply relieved by sleep and rest. For example, a person may feel tired after exercising or after a long day at work but feels rejuvenated after sleep or rest.

There are many dimensions of fatigue—acute fatigue, chronic fatigue, physical fatigue, mental fatigue, emotional fatigue, pain fatigue, and even social fatigue—and many underlying causes of fatigue that makes it challenging to establish a single, unifying definition. That said, an adaptation to a widely accepted definition of cancer-related fatigue is useful for the purposes of this concept presentation. Fatigue is defined as a "*distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion…that is not proportional to recent activity and interferes with usual functioning*."[1] This definition highlights the subjective nature of the concept that makes it so difficult to detect and the interference it can cause in daily life. This definition also describes fatigue in a broader manner, indicating that it is a multidimensional concept that affects the physical, psychological, and/or cognitive aspects of the person's life. Regardless of the underlying cause, Lou[2] suggests that fatigue has two defining characteristics:

1. A perception of generalized weakness, resulting in inability to initiate certain activities. The described weakness is not proportional to the amount of recent activity.
2. Easy physical fatigability that reduces capacity to maintain performance, and/or easy mental (cognitive and emotional) fatigability in that there is a lack of motivation to engage in an activity, or has difficulty with concentration and memory to start or complete an activity.

The definition and defining characteristics allow the nurse to recognize fatigue more easily in the assessment process.

SCOPE

The scope of fatigue is presented on a continuum of having vitality and energy, with no fatigue, at one end to a feeling of exhaustion at the other end (Fig. 28.1). A continuum is a useful representation of this symptom because it is not fixed, and the

Fig. 28.1 Scope of Concept: Fatigue.

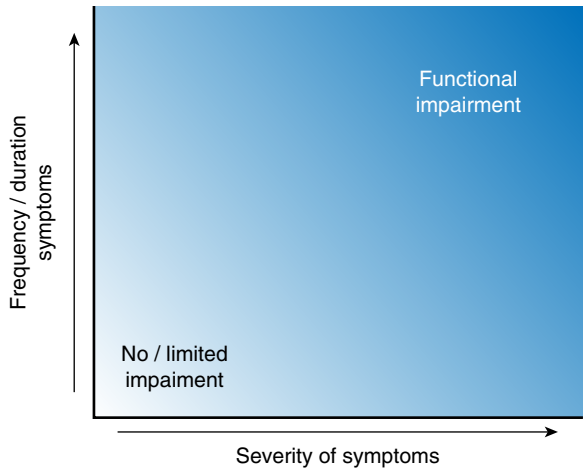

Fig. 28.2 Interrelationship Between Severity and Frequency of Fatigue Symptoms.

severity or intensity of the symptom is highly variable. Moderate to severe fatigue (exhaustion) makes the completion of daily activities a significant challenge and is less likely to be relieved with rest. The degree or intensity of fatigue experienced varies by individual, in part because of underlying health status, but also based on how the symptoms are interpreted and expressed. Thus, discussion of the scope of fatigue also requires the consideration of a second factor—the frequency of symptoms. The frequency of fatigue is influenced by underlying health status and ranges from rare experiences of fatigue to experiencing fatigue on a regular basis. The interplay between severity and frequency is shown in Fig. 28.2, with the most profound impairment occurring at the highest ends of frequency and severity.

NORMAL PHYSIOLOGIC PROCESS

Fatigue can be considered an expected symptom experienced by healthy individuals of all ages, but fatigue is not considered to be normal or expected when it is persistent or severe. Individuals in a healthy state have the mental and physical strength to initiate and sustain actions associated with typical daily activities. This inner strength and the ability to maintain performance support a positive outlook that motivates the person to psychologically stay focused to achieve goals. Healthy individuals experience symptoms of fatigue intermittently when they have overexerted themselves physically. These symptoms are most often associated with demands placed on the cardiovascular, respiratory, and musculoskeletal systems; when exertion exceeds caloric energy reserves; and/or when fluid or electrolyte balances are affected. Mental and emotional fatigue arise from sustained demand on cognitive focus, concentration, or emotionally stressful situations. In these situations, fatigue serves as a useful physiologic signal as the need to rest. In healthy individuals, fatigue is relieved by physical, emotional, and/or cognitive rest.

VARIATIONS AND CONTEXT

When fatigue is persistent and impairs normal life functioning, it is considered a health problem. It is associated with many conditions and is one of the most commonly

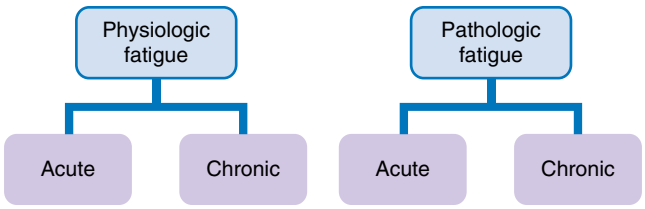

Fig. 28.3 Classifications of Fatigue.

symptoms reported among those seeking health care. For fatigue to be recognized as a significant health problem, it needs to be a prominent symptom for at least 2 consecutive weeks.

Two common classifications of fatigue, physiologic and pathologic (Fig. 28.3), are discussed. Fatigue can be further categorized by duration as either acute or chronic. Acute fatigue is temporary, usually lasting less than 6 months whereas fatigue is considered chronic if it persists greater than 6 months with no improvement from restorative activities.

Physiologic Fatigue

Physiologic fatigue occurs when there is an extended imbalance between an activity (physical, cognitive, emotional) and the typical restorative actions such as rest, sleep, and diet. There is no underlying health condition associated with physiologic fatigue; thus, this type of fatigue tends to be responsive to interventions and/or to a reduction in the activity causing fatigue. These issues are often occupational in nature. For example, fatigue is a common symptom among long-haul truck drivers[3] and shift workers.[4] As another example, mental and emotional fatigue often contribute to challenges in performance and satisfaction among healthcare providers.[5–8]

Pathologic Fatigue

Pathologic fatigue is associated with underlying health conditions or treatment for those conditions. In many cases the fatigue can be resolved or decreased if the underlying problem is addressed. Causes of pathologic fatigue can generally fall into one of two categories: neurologic and nonneurologic. However, the pathologic mechanism underlying chronic pathologic fatigue is often unknown.[9]

Neurologic Fatigue

The origins of neurologic fatigue are through spinal or supraspinal avenues (central fatigue) or through the muscles (peripheral fatigue). Central fatigue is associated with changes in the synaptic concentration of neurotransmitters (e.g., serotonin), increased cortisol levels, or accumulation of inflammatory products within the central nervous system, (CNS) which affect exercise performance and muscle function. It is thought the basal ganglia and suprachiasmatic nucleus of the brain are involved in this process and it is mediated by a complex interaction of neurotransmitters and immune factors.[10–12] Peripheral fatigue results from a physiologic process within the muscle that impairs contraction. This can be caused by a number of

things—including a loss of electrical conduction, impaired calcium levels, or buildup of waste products—which affects muscle performance.

Nonneurologic Fatigue

Nonneurologic fatigue, caused by an underlying illness and/or medical treatments for the illness, is responsible for the large majority individuals who experience chronic fatigue. Similarly, fatigue is a classic symptom associated with acute and chronic conditions affecting most body systems (such as cardiovascular, respiratory, renal, hepatic, gastrointestinal, immune, and hematologic). As one example, individuals suffering from cardiovascular and/or respiratory compromise experience fatigue because of reduced perfusion of oxygenated blood. Cancer, infection, and medical treatments (such as surgery and cancer-related treatments) also represent common underlying causes of nonneurologic fatigue. Research into cancer-related fatigue has demonstrated that those experiencing severe fatigue had increased proinflammatory cytokines produced either by the tumor or tissue damage from chemotherapy or radiation therapy. It is believed that cancer-related fatigue could be attributed to those increased inflammatory products.[13] Growing evidence suggests that myalgic encephalomyelitis (ME), which is also known as chronic fatigue syndrome (CFS), is associated with inflammation within the brain.[14] Many mental health conditions, particularly depression and anxiety, are considered underlying causes of fatigue. However, chronic unresolved fatigue is linked to depression, anxiety, and/or substance use disorders, thus making these comorbid conditions (Box 28.1).

CONSEQUENCES

Chronic fatigue usually leads to many changes in a person's life. When confronted with persistent fatigue, individuals typically make adaptations to their daily routines and often eliminate leisure activities to leave more energy for basic activities of daily living. However, ongoing, progressive fatigue can lead to more significant changes including the inability to maintain employment, loss of relationships, and even the inability to care for oneself. Children may fall behind in school and/or have developmental delay. Quality of life is affected, and further losses can lead to significant psychological consequences, particularly depression. In fact, depression and fatigue are so closely interrelated that it is often difficult to separate these two phenomena. People with fatigue are depressed and fatigue is a leading symptom among those with depression. Although fatigue does not cause death or organ failure, mortality from suicide is higher in patients with chronic idiopathic fatigue than in the general population.[15]

BOX 28.1 Diagnostic Criteria for Chronic Fatigue Syndrome/Myalgic Encephalomyelitis

1. A substantial reduction or impairment in the ability to engage in preillness levels of occupational, educational, social, or personal activities, that persists for more than 6 months and is accompanied by fatigue, which is often profound, is of new or definite onset (not lifelong), is not the result of ongoing excessive exertion, and is not substantially alleviated by rest, **and**
2. Postexertional malaise, **and**
3. Unrefreshing sleep
4. At least one of the two following manifestations is also required:
   - Cognitive impairment **or**
   - Orthostatic intolerance

From Institute of Medicine. *Beyond myalgic encephalomyelitis/chronic fatigue syndrome, redefining an illness*. Washington DC: National Academy of Sciences. 2015.

RISK FACTORS

All individuals are potentially at risk for fatigue, regardless of age, gender, race, or ethnicity. Specific risk factors for chronic fatigue are linked to underlying causes of the condition.

Populations at Risk

Older Adults

Fatigue perception and fatigability increase with age. Older adults are at greatest risk for experiencing fatigue from physiologic changes associated with aging and the fact that many elderly have underlying conditions contributing to fatigue. Middle-aged adults between ages 40 and 50 years are the most common group to experience chronic fatigue.[16] Although fatigue is reported by all age groups, younger adults report fatigue more frequently than older adults. It is believed that older adults more likely attribute fatigue to their underlying health conditions or to their advanced age, and, thus, may view it is expected or normal. Young adults, on the other hand, with heavy responsibilities of balancing career, marriage, and childbearing, often view fatigue as a significant problem.

Women

During childhood, diagnosis of CFS is equally weighted in the genders. However, after puberty, females are two to three times more likely to be diagnosed with CFS.[17]

Individual Risk Factors

Genetic Predisposition

Preliminary evidence suggests that variations in inflammation-related genes may increase risks for fatigue. Although this area needs more study, findings suggest a genetic predisposition to fatigue and should be considered a general risk factor.[12]

Underlying Conditions

Most individuals experiencing fatigue have an underlying health condition. Fatigue is a common feature of many illnesses, such as neurologic disease, malignancy, hematologic disease, CFS, and autoimmune disease (e.g., systemic lupus erythematosus); heart, liver, thyroid, or kidney disease; and many infections. A hematologic condition such as anemia, in which there is a loss or decreased production of red blood cells, represents an example of fatigue from physical disease. The resultant fatigue would be accentuated if the anemia occurred during a short period of time. Fatigue is highly

correlated with mental health conditions as well. Fatigue is nearly always reported in people with depression. Exposure to childhood stress, including abuse or neglect is also associated with increased risk for fatigue.

Treatment-Related Factors

Many cases of fatigue are attributable to medical treatments for other conditions. For example, β-blockers, a gold standard in the treatment of heart failure, have at times made patients' fatigue worsen. β-Blockers have been shown to increase free fatty acids and glycogenolysis, which lead to insufficient nutrient supply and, thus, increase fatigue. Fatigue is a common side effect associated with many medications (e.g., sedative–hypnotics, antidepressants, muscle relaxants, opioids, antihypertensives, antihistamines, and many types of antibiotics). Psychoactive substances such as alcohol, nicotine, and caffeine can also result in fatigue, especially during periods of withdrawal. Therapy for cancer, such as radiation and chemotherapy, kills rapidly proliferating cells. This therapy can cause anemia, resulting in decreased tissue oxygenation and fatigue.

Nutritional Status

Proper nutrition is necessary to provide the body with essential nutrients for optimal functioning. Individuals with nutritional deficiencies, particularly protein–calorie malnutrition, are at risk for experiencing fatigue because of inadequate energy sources. Because nutritional deficiencies accompany many chronic conditions, the fatigue symptoms may be attributed to both or either.

Lifestyle Choices

A person's lifestyle choices have a significant effect on fatigue. Physiologic fatigue can be induced by exercising excessively, consuming a poor diet, excessive alcohol consumption, not sleeping, or working excessively. People with a history of working nights or rotating shifts are also at risk.[4] A disruption of the circadian rhythm may make individuals feel tired when they need to be awake and/or interfere with sleeping, thus causing fatigue.

ASSESSMENT

History

Because fatigue is a subjective experience, the assessment should be focused on the patient's report about his or her fatigue experience. When conducting an interview, use open-ended questions that encourage the patient to describe the fatigue in his or her own words. Ascertaining the patient's personal experience can assist the nurse in planning specific interventions to ameliorate the effects of a person's fatigue. Use a symptom analysis to fully explore the symptom of fatigue with a patient during the health history.[18]

- *Personal description of the fatigue:* Fatigue is a subjective experience so it will be a different experience for each person. Most patients experiencing fatigue will describe their fatigue as the inability to concentrate, and/or complete specific activities because of a lack of energy or stamina.
- *Onset and Duration:* Ask the patient when they first began to experience the fatigue and if the symptoms occurred suddenly or appeared more gradually Also ask if the fatigue has remained approximately the same, worsened, or improved. Fatigue, as a symptom, is not a static entity and may change daily, so it is also important to determine the usual daily pattern of the fatigue. This will help clarify the patient's usual fatigue pattern and identify when it worsens.
- *Factors that alleviate or exacerbate:* Ask the patient what makes the fatigue worse or better to tailor patient-centered interventions. There may be symptoms of other conditions that are contributing to the fatigue. For this reason, it is important to assess the existence of pain, sleep pattern disturbance, and poor nutrition. Assessing for interrelated concepts could help the nurse identify other contributing factors. For example, assessing the effect of rest and sleep on fatigue will help detect if the fatigue is caused by a physical or mental illness. Generally, fatigue that worsens with activity and lessens with rest suggests a physical disorder.
- *Effect on daily life:* Ask the patient how the fatigue affects activities of daily living (such as his or her ability to work, socialize, participate in family activities, and libido) and what accommodations the patient/family has made to adjust. Keeping an activity and rest journal may help discover the patient's personal limits.
- *Other physical, emotional, and cognitive symptoms that accompany the fatigue:* Studies of fatigue indicate that there is a strong positive correlation among fatigue, depression, and perceived stress.[19] For this reason, ask the patient about a history of depression and stress.

Examination Findings

The history can guide appropriate focused physical assessment and diagnostic tests to rule out underlying diseases. Recognition of pathological causes of fatigue is important so that the life-altering effects of fatigue can be diminished by appropriately treating this disease.

Inspection

Observe the individual's general appearance. Is the individual alert? Is he or she displaying any psychomotor agitation or impairment? Take note of the individual's personal grooming. Poor alertness, psychomotor impairment or agitation, and poor grooming could be evidence that the patient is experiencing a mood and affect disorder such as depression. If the patient's appearance is unkempt, it could also indicate that the fatigue is affecting the patient's self-care. Look at the patient's posture. Does he or she appear slumped? Is the patient's gait appropriate? Observe the patient's skin. Is the skin pale, suggesting anemia?

Palpation and Auscultation

Palpation is indicated to assess for the presence of lymphadenopathy, thyroid nodules, or goiter. These findings could indicate the need to test further for cancer, thyroid disease, or infection. Examine muscle appearance, strength against resistance, deep tendon reflexes, and sensory and cranial nerve action to assess the neuromuscular system. Some neuromuscular diseases can

TABLE 28.1 Self-Report Instruments to Measure Fatigue

Instrument	Dimensions assessed/target population
Brief Fatigue Inventory (BFI)	Measures amount of fatigue but hard to distinguish between mild and moderate types and activities affected by fatigue. Used with adults having Parkinson disease or cancer.
Child Fatigue Scale (CFS)	Assesses the multidimensional aspects of fatigue in children. Used with children experiencing cancer.
Fatigue Severity Scale (FSS)	Measures severity, how fatigue interfered with certain activities over the previous week. Used with adults having multiple sclerosis or lupus.
Fatigue Symptom Inventory	Measures severity, frequency, diurnal variation, and interference with daily functioning. Used with adults experiencing cancer.
Multidimensional Fatigue Inventory (MFI)	Measures general, physical, and mental fatigue; reduced motivation; and reduced activity. Used with various adult populations, including those with cancer, chronic fatigue syndrome, or COPD.
Multidimensional Assessment of Fatigue (MAF)	Measures severity, distress, degree of interference in activities of daily living, timing (frequency of occurrence and changeability). Used with adults with arthritis, cancer, or COPD.
Modified Fatigue Impact Scale (MFIS)	Shorter version of the full Fatigue Impact Scale; Measures the effect of fatigue over the previous 4 weeks on physical, cognitive, and psychosocial functioning. Used for adults with MS.
Piper Fatigue Scale	Measures fatigue in four dimensions: sensory, behavioral/severity, affective meaning, and cognitive/mood. Used with adults having cancer, myocardial infarction, or HIV.
Visual Analog Scale of Fatigue	Represents severity of physical and mental fatigue over last 24 hours. Used with adults having neuromuscular disease, cancer, or end-stage renal disease. Adaptable to children.

COPD, chronic obstructive pulmonary disease; *HIV,* human immunodeficiency virus.

decrease muscular bulk, tone, and strength, which increases the patient's risk for fatigue. Auscultation of the heart and lungs helps to identify underlying pulmonary or cardiac conditions that may be contributing factors.

Diagnostic Tests

There are no specific diagnostic tests for fatigue. Many self-report scales have been developed, but they often overlap with other symptoms and/or do not capture all the features of this multidimensional concept. Table 28.1 presents reliable and valid instruments commonly used to measure the concept of Fatigue. It is also important to use an age-appropriate instrument; there are fewer instruments that are appropriate for children.[20]

Other diagnostic testing may be done to rule out underlying diseases that may be causing fatigue. Common laboratory tests include thyroid function tests, complete blood cell count with differential (to rule out anemia and infection), chemistry profile (to rule out electrolyte imbalances and alteration in glucose levels), erythrocyte sedimentation rate (inflammatory disease), urinalysis (urinary infection and renal impairment), liver and renal function tests, human immunodeficiency virus antibody tests, and a pregnancy test in women of childbearing age. If peripheral fatigue is suspected, electromyography can be performed to test muscle performance. Transcranial magnetic stimulation (TMS), magnetic resonance imaging (MRI), and magnetic resonance spectroscopy can be completed to determine whether brain problems are causing the fatigue. Some health professionals use performance-based testing to determine whether a patient experiences fatigue with difficult physical or cognitive activities. However, researchers have found that measurement of muscular or cognitive fatigue through performance tests does not correlate with the individual's perception of the amount of fatigue they experience.[19]

CORE COMPETENCIES

Fatigue

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to fatigue.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to fatigue management for individuals.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address fatigue symptoms.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention refers to intentional activities to prevent disease. In the case of fatigue, basic primary prevention measures are associated with following a healthy lifestyle—good nutrition, exercise, getting adequate sleep, and managing stress. Patient teaching designed for an individual with risk factors is a common way nurses can facilitate primary prevention measures. For example, individuals prone to iron deficiency anemia can be advised to increase dietary intake of iron or iron supplements.

Secondary Prevention (Screening)

Secondary prevention refers to screening efforts for early detection of disease. Because fatigue is a symptom associated with multiple health conditions, there are no population-wide screening efforts for fatigue. However, screening for fatigue is specifically incorporated into treatment guidelines for conditions using reliable screening tools (see Table 28.1). As one example, routine fatigue screening is recommended among cancer patients.[21]

Collaborative Interventions

Collaborative interventions for individuals experiencing fatigue requires a multidimensional and multidisciplinary approach. Interventions must take into account physical and psychosocial aspects of care and are geared toward assisting the patient to accomplish the activities of daily living, return to work, and maintain interpersonal relationships. Most patients who experience chronic fatigue state that they believe their fatigue is misunderstood by healthcare professionals. Many healthcare providers mistake serious fatigue without a clear underlying cause as a mental health condition or consider it to be all in the individual's imagination. This perceived lack of concern causes patients with fatigue extreme frustration because they have difficulty or delays getting a diagnosis and treatment.[16] As healthcare providers, it is important to validate with patients that fatigue is a genuine problem and that it exists as they say it does. Nurses need to acknowledge that it is a subjective experience that can significantly affect an individual's quality of life. Establishing a therapeutic relationship between the patient and the healthcare team is essential; through this relationship, nurses can support the patient's feelings of control, which can help lessen the patient's fatigue.

For individuals experiencing ***physiologic fatigue,*** interventions are aimed at improving lifestyle behaviors, including managing stress with effective coping strategies, daily exercise, a nutritious diet, and sleep. Two variables associated with sleep include the duration and the quality of sleep.[22] The duration of sleep considered "adequate" varies with different age groups, but it is usually 7 or 8 hours per night for adults, 9 hours for adolescents, and 11 or 12 hours for toddlers.

Interventions for ***pathologic fatigue*** include those mentioned above (sleep, nutrition, stress reduction), but these alone are not sufficient. Because pathologic fatigue is caused by underlying health conditions, optimal management of the underlying condition is a first step. Specific strategies for fatigue reduction are often disease specific—in other words, there are specific strategies to manage cancer-related fatigue that differ from strategies to manage fatigue associated with heart failure, or strategies to manage ME/CFS. That said, interventions for fatigue generally falls into four groups: exercise and rest, adaptive pacing therapy, cognitive-behavioral therapy, and complementary alternative medicine.

Exercise and Rest

Known as rehabilitation therapies, exercise and rest are common interrelated interventions for fatigue, regardless of the underlying cause. Exercise is an essential component of rehabilitation for patients with chronic conditions. In fact, exercise has been shown to have the largest effect on fatigue symptom reduction compared with other nonpharmacologic interventions.[23–25] Exercise has been shown to increase endurance and stamina, thereby reducing fatigue symptoms, and increasing activity and independence.

The amount and type of exercise is tailored to the individual, based on the underlying health condition and individual capability. Exercise may be as simple as encouraging a patient to walk twice a day, or it may represent a robust exercise regimen.

BOX 28.2 Energy Conservation Strategies

- Plan the day to balance work and rest times. Plan work around times of the day when fatigue is least. Include rest periods in the day or rest at least an hour. Rest during fatiguing activities that take 30 min or longer.
- Communicate needs for assistance to family members or willing helpers. Delegate part or all of an activity to that person.
- Analyze and modify activities to reduce energy expenditures. Conserve energy so it can be consumed doing something that the person really enjoys. Simplify activities so they require less energy. Eliminate part or all of an activity that is difficult. Modify frequency or expected outcomes of an activity. Adjust priorities for energy expenditure.
- Organize self ahead of time to avoid rushing.
- Organize work spaces. Assess height of work surfaces. Avoid working above head—better to keep items at waist level. Organize work centers so that equipment is within easy reach. Position equipment, furniture, or supplies for easy access; arrange household activities on one floor.
- Use adaptive equipment, gadgets, or energy-saving devices.
- Use body efficiently. Use larger muscles, bend knees, and sit whenever possible.

Adapted from Blikman LJ, Huissede BM, Kooijmans H, et al. (2013). Effectiveness of energy conservation treatment in reducing fatigue in multiple sclerosis: A systematic review and meta-analysis. *Archives of Physical Medicine and Rehabilitation, 94*(7), 1360–1376.

Graded exercise therapy is a carefully structured, supervised exercise program that begins gradually and builds to a moderate daily amount of exercise to build stamina and prevent increased fatigue.[24,25] This is particularly appropriate therapy for those who are deconditioned. A group exercise program has many positive benefits for those with chronic fatigue, particularly from a supportive perspective.[26] Motivating children and adolescents to adhere to exercise regimens has been found to be difficult, so it is important to involve parents to increase adherence.[27]

Planned rest breaks throughout the day also benefit the patient. Naps should be short and limited to less than 1 hour. The best time for naps is early afternoon because fatigue in most patients worsens as the day progresses. Energy conservation activities are also a valuable asset to avoid fatigue (Box 28.2). Energy conservation activities implies that the patient saves as much energy as possible to spend when participating in activities that are meaningful to them.[28] When delegating some responsibilities to others, patients are often afraid of becoming a burden, but it is important to use those who volunteer to do chores when the patient does not have the energy to do it.

Adaptive Pacing Therapy

Adaptive pacing therapy (APT) is an important strategy that refers to balancing activities and rest to avoid overexertion. It is important for the person to maintain activities yet pace themselves by listening to their bodies to avoid overexertion, which can not only be detrimental to the body, but can also add to the fatigue. Patients undergoing APT are taught to set reasonable targets for daily activities and self-monitor their fatigue levels to balance rest and activity. This process helps them learning to prioritize activities based on their pattern of fatigue. ME/CFS are particularly vulnerable to postexertional malaise, which

can remain for days or even weeks and can exacerbate disability from ME/CFS.[16,29] Pacing helps to minimize postexertional malaise.

Pharmacologic Agents

There are no standard drug therapies to treat fatigue itself. Pharmacologic agents are used to treat underlying conditions that can cause fatigue, and also agents are used to help relieve and manage fatigue symptoms.

Agents aimed at treating underlying conditions. Several pharmacologic agents are used in the treatment of fatigue, with a focus on treating underlying conditions linked to the fatigue. For example, thyroxine may be administered to patients experiencing fatigue associated with hypothyroidism. Thyroxine, a synthetic hormone, will increase the basal metabolic rate to normal, resulting in a reduction of fatigue. Research has identified biomarkers that could be used to target treatments to remediate cancer-related fatigue.[30] These are but a few examples of many pharmacologic agents that improve fatigue through the treatment of the underlying condition. Several drugs have been studied for the treatment of ME/CFS but there has yet to be clear evidence leading to drug approval for treatment.

Agents for treatment of fatigue symptoms. Several agents are used to help minimize fatigue-related symptoms.

- NSAIDS are used to relieve pain and inflammation symptoms. For ME/CFS, these address joint pain, muscle pain, headaches.
- Antidepressants. Antidepressants may be prescribed because of the close association between depression and fatigue. Because fatigue often coexists with depression, an improvement in depression may alleviate the symptoms of fatigue. If depression is not treated, then it is unlikely that the fatigue will respond to other therapies
- CNS stimulants. Agents such as methylphenidate (Ritalin), modafinil (Provigil), and caffeine have been used to reduce fatigue symptoms; however, this group of drugs can cause headaches, restlessness, insomnia, and dry mouth. Recommendations are to use these medications with more advanced fatigue symptoms and for short-term use.

Cognitive Behavioral Therapy

Cognitive behavioral therapy (CBT) has been shown to improve fatigue symptoms through psychosocial support, individualized counseling, group support, and spiritual care. It is thought that the benefit of CBT provides a better understanding of activity patterns that exacerbate fatigue and enhancing coping and acceptance to the illness causing fatigue, but does not offer a curative treatment.[9,31] This intervention is especially beneficial with fatigue associated with ME/CFS and multiple sclerosis. CBT uses a series of sessions designed to help patients become aware of the stressors that make their symptoms worse and alter their beliefs and behaviors that might delay recovery. Other activities designed to distract the patient (e.g., games, music, reading) may be helpful at decreasing fatigue, but the actual benefits and mechanisms behind this strategy are unknown.

Complementary Therapy

Although the evidence has not been clearly established, many complementary therapies such as yoga, meditation, progressive muscle relaxation, and American ginseng may be effective in managing fatigue. These therapies are often recommended as supplementary to other established interventions for fatigue.[9] The benefit of many other therapies such as acupuncture, acupressure, massage, guided imagery, and aromatherapy are also inconclusive; however, some patients find these helpful.

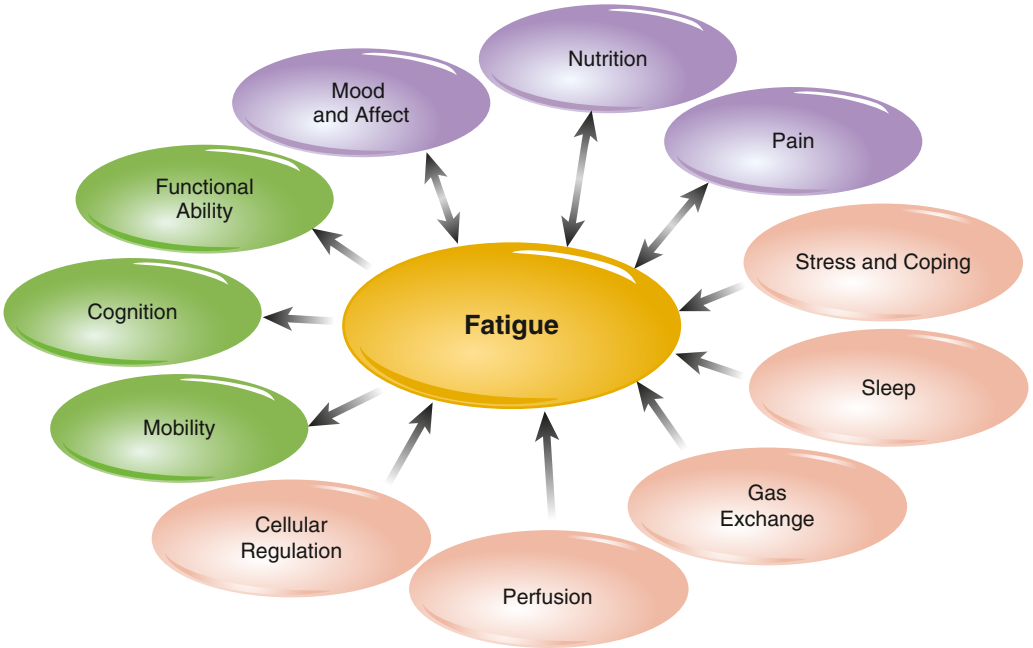

Fig. 28.4 Fatigue and Interrelated Concepts.

INTERRELATED CONCEPTS

The concept of Fatigue is closely interrelated with many concepts presented in this textbook (Fig. 28.4). **Mood and Affect**, **Nutrition**, and **Pain** are shown with bidirectional arrows because of the interrelated cause and effect on fatigue. With each of these concepts, fatigue is a prime symptom of many of their exemplars and can also increase the risk for fatigue. Depression is an example of this phenomenon. Fatigue is listed as one of the diagnostic criteria for depression, which is an exemplar of mood and affect. In addition, fatigue can cause the individual to experience many losses, and this could lead to depression. **Gas Exchange**, **Perfusion**, **Cellular Regulation**, **Sleep**, and **Stress and Coping** are contributors to fatigue. Also, fatigue can significantly affect the concepts of **Mobility**, **Cognition**, and **Functional Ability**, shown as ovals with an arrow pointing toward those concepts in Fig. 28.4. If an individual is significantly exhausted, his or her ability to think, mobilize, and perform normal daily activities becomes impaired.

CLINICAL EXEMPLARS

Featured Exemplars

Many exemplars related to fatigue exist in the clinical arena and are seen in all areas of the population. These featured exemplars demonstrate conditions that are commonly associated with pathologic fatigue. Box 28.3 presents additional common exemplars across the life span.

BOX 28.3 EXEMPLARS OF FATIGUE

Physiologic Fatigue
- Excessive physical activity
- Sleep deprivation
- Excessive caffeine or alcohol use
- Dehydration
- Pregnancy

Pathological Fatigue

Neurologic
- Central—spinal/supraspinal (traumatic brain injury, stroke, amyotrophic lateral sclerosis, multiple sclerosis, Parkinson disease)
- Peripheral—nerve/neuromuscular transmission/muscle (neuromuscular disorder, muscle ischemia)

Nonneurologic
- Viral Infection (mononucleosis, influenza, pneumonia, COVID-19, HIV infection)
- Rheumatologic (systemic lupus erythematosus, rheumatoid arthritis)
- Hematologic (anemia)
- Cancer-related fatigue
- Cardiac (heart failure, myocardial infarction)
- Endocrinologic (hypothyroidism, diabetes type 1 and type 2)
- Mental Health Conditions (depression, anxiety, substance use)
- Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS); also known as Systemic Exertion Intolerance Disease (SEID)
- Pulmonary (COPD, asthma)
- Protein–calorie malnutrition
- Renal (chronic renal failure)
- Treatment-related (chemotherapy, radiation therapy, surgery, medications)

COPD, chronic obstructive pulmonary disease; *HIV*, human immunodeficiency virus.

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

ME/CFS, also known as systemic exertion intolerance disease (SEID), is a poorly understood condition because it lacks a definite pathology and there is no known cure. An estimated 2.5 million American's have ME/CFS. The diagnosis is based on self-reported symptoms and the exclusion of other health conditions that could cause fatigue. The primary symptoms include excessive, persistent fatigue (not caused by excessive exertion and not alleviated by rest), postexertional malaise, unrefreshing sleep, cognitive impairment, and orthostatic intolerance.[16] Other symptoms include muscle and joint pain and headaches. ME/CFS occurs in adults, adolescents, and children. Childhood and adolescent ME/CFS often occurs after an infection with Epstein–Barr virus.

Cancer-Related Fatigue

Fatigue that is associated with a cancer diagnosis is referred to as cancer-related fatigue. Prevalence rates for fatigue in cancer patients range from 80% to 100% depending on the type of treatment, the stage of the cancer, and the method for measuring the fatigue; approximately one-third will have persistent fatigue for a number of years posttreatment. Cancer-related fatigue is thought to be a result of proinflammatory cytokines, hypothalamic–pituitary–adrenal dysregulation, circadian rhythm desynchronization, skeletal muscle wasting, and/or genetic dysregulation. The National Comprehensive Cancer Network (NCCN) has developed a comprehensive algorithm to assess and treat cancer-related fatigue in adults and children.[1]

Renal Failure–Related Fatigue

Fatigue is one of the most significant symptoms reported by individuals with end-stage renal disease (ESRD). It is estimated to affect between 60% and 97% of individuals with ESRD, with greatest severity among those undergoing hemodialysis treatment. The exact cause of fatigue with ESRD is not well understood but is thought to be associated with systemic inflammation, C-reactive protein, IL-6, and having lower albumin and hemoglobin levels.[32]

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is a chronic condition associated with airway obstruction that makes it difficult to move air out of the lungs, leading to dyspnea and hypoxemia. A significant amount of energy is used by the patient just for the work of breathing. With COPD, a person has a decline in lung function, which can result in decreased exercise tolerance. Over time, patients may also experience decreased muscle strength from deconditioning. The patient with COPD experiences decreased endurance as a result of fatigue, dyspnea, and an imbalance between oxygen supply and demand, and can lead to a reduced ability to accomplish activities of daily living.[33]

Mononucleosis

Mononucleosis is an acute, self-limiting infection disease usually caused by the Epstein–Barr virus and is most common among children and young adults up to age 25 years. This infection is characterized by the symptoms of fatigue, sore throat, fever, generalized lymphadenopathy, and splenomegaly. These symptoms

vary greatly in type, severity, and duration. Patients will typically complain of difficulty maintaining their usual level of activity. The severity of symptoms tends to be milder among younger children and more severe among young adults. The prognosis for recovery from the disease is good. The acute symptoms of the disease will last 10 days to 6 weeks after exposure but may persist for several months.[34]

CASE STUDY

From Stockbyte/Thinkstock.

Case Presentation

Helen Morris is a 55-year-old female who lives with her husband in a suburban community. She is the senior managing editor for a major newspaper. She presents to a healthcare clinic with the complaint of "getting the flu and cold" for the second time in 3 months and reports "feeling exhausted" and having to "drag herself into work." On the weekends, she describes spending most of her time resting so that she can go back to work on Monday. She adds, "The rest does not last long because by Wednesday I feel exhausted again. My life has become limited—all I can do is to go to work." She states that when she is at the office, by the afternoon she is exhausted and her muscles ache. She states, "Sometimes I am so tired I cannot even think well enough to complete my work." She states that she has tried to eat better and stopped drinking anything with caffeine, but it has not seemed to make her fatigue any better. She describes the fatigue as starting approximately 6 months ago. The fatigue worsens with any activity. She expresses frustration at being unable to do the things she enjoys, and she wants to find the cause.

Her history reveals anemia with pregnancy, but otherwise she has had no health problems, nor does she take any prescribed medications. She says she sleeps but does not feel rested when she wakes up. She denies weight loss or gain, polyuria, polydipsia, or cold intolerance. Her social history is negative for the use of alcohol, relationship problems, or situational stress. She denies having symptoms of depression.

On examination, the patient is alert and well groomed. Her skin is race appropriate, not pale or jaundiced. She is afebrile, and her vital signs are within normal limits. The heart, lung, musculoskeletal, and neurologic exam yields normal results. She has no lymphadenopathy. She reports going through menopause and having no menstruation for 2 years. Her hemoglobin is 11.2 mg/dL, and total serum iron is 150 mcg/L. Her thyroid-stimulating hormone, kidney, and liver enzymes are within normal limits.

Case Analysis Questions

1. In what ways does this case exemplify chronic fatigue?
2. What factors make this situation consistent with ME/CFS?
3. What kind of collaborative interventions would be helpful to increase the quality of life for Helen Morris?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 29

Stress and Coping

Cara C. Young and Stephanie M. Key

Stress, a physiological or psychological response to internal or external stressors, plays a role in every aspect of our lives. The stress response involves changes that affect nearly every system of the body, which, in turn, influences individuals' emotions and actions.[1] Because all people experience stress, it is considered a normal physiological process associated with regulation and homeostasis. Coping represents an individual's response to stress. Individual responses to stress vary because what is perceived as a stressful situation to one person may not be perceived in the same way by another. Coping responses are actions taken to minimize or reduce the stressor to get back to a state of homeostasis, well-being, and health. The experience of stress involves cognitive appraisal, perception, physiological and psychological manifestations, feelings, and symptoms.[2] Coping actions are part of the experience and, in the perfect scenario, are applied appropriately to the level and severity of stress.[2–5] Although humans are resilient, there is a finite capacity for responding to and managing stress. Those who experience a level of stress that exceeds their capacity to cope with are at risk for disease and disability.[6] This concept presentation focuses on physiologic and psychologic stressors, the consequences of stress, and the process of coping.

DEFINITION

The word *stress* has existed since the 14th century, with a meaning of hardship, adversity, or affliction. In the early 20th century, Walter Cannon first described the stimulus and response (fight or flight) to the perception of a physical or emotional threat.[7] Hans Selye brought the concept of a general adaptation syndrome to popular society by proposing a reaction theory wherein stress is the sum of all the effects of factors that act on the body, with both pleasant and unpleasant stressors being equally important.[8] Although early experiments supported various species responding in a stereotypical reaction to events such as infection, trauma, nervous strain, heat, cold, or fatigue, continuing work demonstrated that there was not always a precise uniform response.[8–10] Later theorists proposed stress as an appraisal process with a defined series of steps. The foundation for contemporary perspectives evolved, with stress characterized as a response, interaction, and outcome.[2,4] A commonly accepted view is that stress is a series of reactions to external and internal demands with the cumulative effect determined by the duration, severity, resources, and coping actions taken, whereas coping is an action directed toward change through conscious or unconscious thoughts and behaviors to avoid harm and restore balance.[6]

Lazarus and Folkman laid the foundation for the contemporary view of stress and coping with their transactional theory.[2] This theory is based on their research and is conceptualized as a person–environment interaction, cognitive appraisal for level of threat, harm, or taxing of resources, and coping action to reduce or manage threat. Coping is most effective if there is a match between threat level and the individual's ability to adapt to and change a situation within the available coping resources, skills, and abilities.[2–5] For the purposes of this concept presentation, stress and coping as a concept is defined as *a continual process that starts with an event that is experienced by the individual, perceived through intact information processing channels, appraised for scope and meaning, assessed as neutral, manageable, or threatening within current capacity of coping skills, resources, and abilities, ending ideally in a positive outcome of homeostasis and feeling of well-being.*

SCOPE

The scope of stress and coping is shown in Fig. 29.1 on a continuum of stress-neutral, challenge/manageable, and stress-not manageable (severe). Stress-neutral represents typical day-to-day stress and is well within existing coping resources to manage. Challenge/manageable stress represents a person who is faced with moderate to great stress and necessitates use of existing and potentially new resources and coping actions to effectively reduce, eliminate, or manage stress. In situations resulting in severe stress (stress-not manageable), the stress threat exceeds coping capacity, leading to exhaustion of resources. Outside assistance and resources are needed.

This concept presentation primarily focuses on the way a stressor affects the individual, specifically, in an internal, localized context (cells, organs, or body systems). However, stress

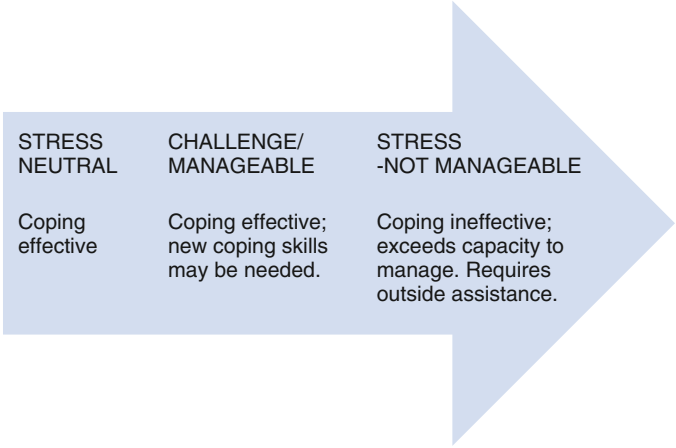
STRESS NEUTRAL
CHALLENGE/ MANAGEABLE
STRESS -NOT MANAGEABLE
Coping effective
Coping effective; new coping skills may be needed.
Coping ineffective; exceeds capacity to manage. Requires outside assistance.

Fig. 29.1 Scope of Concept: Stress and Coping.

and coping can also be viewed within a family or community context,[11] which would include how an event affects the family or community and the resources that are available to family members within their community. Schools, teachers, counselors, parks, recreation, and healthcare provider access are important resources that vary within communities. *Family resources* refers to the ability of family members to respond when individual members are faced with challenges.[11] Communities have a capacity to respond, using available resources, and will do so effectively if resources are appropriate for the duration and severity and do not exceed capacity. Stress and coping can also be considered at the macro level. For example, an environmental event, such as a natural disaster, or a terroristic attack affects an entire society. Although there are societal outcomes, each individual within the population involved will respond based on his or her own perception of the event and the personal effect it has for him or her.

NORMAL PHYSIOLOGICAL PROCESS

Stress is a normal aspect of the human experience. In most cases, day-to-day stress is managed successfully; the individual maintains homeostasis, and the stress minimally affects or interrupts daily life activities. The optimal stress/coping action relies on intact, functioning body systems. Stress triggers a physiologic response involving the nervous, endocrine, and immune systems, which affects other body systems, including the cardiovascular, respiratory, renal, gastrointestinal, and reproductive systems, and influences psychological well-being.

Neuroendocrine Response

Perceived events or demands cause an anticipatory response beginning in the limbic system. If the stressor is perceived as minor, subtle physiological, psychological, and behavioral processes compensate for the stressor. The individual may not be aware these processes are occurring and the stress is being managed.[6]

When a stressor is perceived as a more serious threat, a stress response is initiated by the nervous and endocrine systems, particularly the hypothalamus, sympathetic nervous system (SNS), pituitary gland, and adrenal gland. These systems synchronize a complex series of reactions leading to a coordinated response directing energy for adaptation (Fig. 29.2).

The hypothalamus secretes corticotropin-releasing factor (CRF), which activates the SNS, the anterior pituitary, and the posterior pituitary. Activation of the SNS causes the release of catecholamines (norepinephrine, epinephrine, and dopamine). Norepinephrine is released throughout the brain, triggering neural pathways for sensory information, and stimulating arousal, vigilance, anxiety, and labile emotions.[6,12] The physiological response (known as the *fight-or-flight response*) is the result of the release of catecholamines epinephrine and norepinephrine. Specifically, these hormones increase heart rate, blood pressure, and cardiac output; dilate bronchial airways; dilate pupils; increase blood flow to the skeletal muscles; and increase blood glucose level. There is a concomitant decrease in blood flow to nonessential organs (e.g., the digestive system).

At the same time, CRF stimulates the anterior and posterior pituitary gland to release several hormones, including antidiuretic hormone, prolactin, growth hormone, and adrenocorticotropic hormone (ACTH). ACTH triggers secretion aldosterone and cortisol, a glucocorticoid, from the adrenal cortex. Cortisol mobilizes cellular metabolism, particularly glucose and protein metabolism. The net effect is increased blood glucose (through gluconeogenesis and inhibition of glucose update and oxidation in selected body cells) and amino acids (through catabolic effects of muscle). In elevated levels, cortisol also has a role in the immune response, including immunosuppressive and anti-inflammatory effects.

When the stressor and threat is eliminated, or when the individual deems an event to be neutral or a challenge within their capacity to manage, the alarm response is halted. Sustained stress, however, has a negative effect on organs, body systems, and health and well-being.[6] A prolonged or chronic heightened stress response that is not adequately managed through effective coping exhausts capacity and the ability to maintain homeostasis. Physical, psychological, and behavioral manifestations lead to overt stress symptoms.[6,12]

Age-Related Differences

Because the stress response is based on a neuroendocrine response, there are few discernable differences in the physiologic stress response across the lifespan. Age-related differences are primarily associated with cognitive appraisal of events that determine whether a situation is a threat or not. Cognitive appraisal and coping strategies are associated with cognitive development and life experiences.

VARIATIONS AND CONTEXT

There are variations in stress and coping responses seen across the life span, especially when stress is severe and/or prolonged. These variations include the sources and type of stress, and how the stress is perceived, as interpreted through a cognitive appraisal. Individual variables such as age, developmental level, maturation, environment, life experiences, and the individual's general mental and physical health status affect the cognitive appraisal.

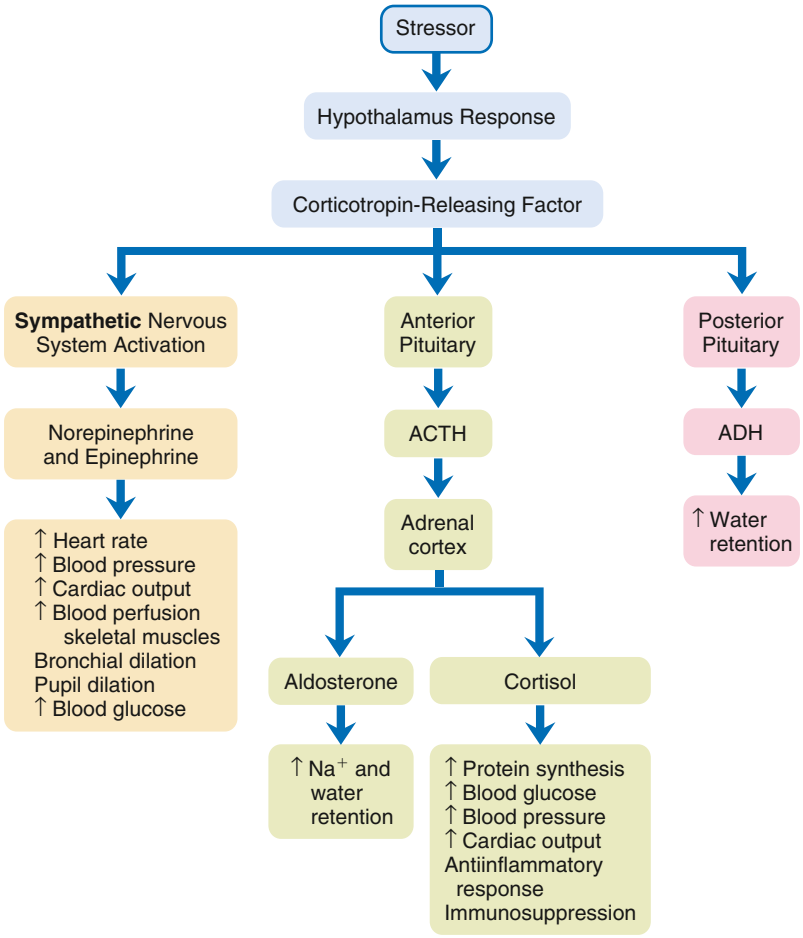

Fig. 29.2 Physiology of Alarm Response Sympathetic Nervous System Effects. *ACTH,* adrenocorticotropic hormone; *ADH,* antidiuretic hormone.

Sources of Stress

Physiological Stressors

Physiological stress refers to a stressor that originates as a physiological trigger and usually is specifically associated with an injury or illness (Table 29.1). Some acute physiological stressors are life-threatening states such as trauma, acute myocardial infarction, or acute renal failure. An acute stress response is immediate, often intense, and necessary for survival. Chronic physiological stress can lead to debilitating disease.

Psychological/Emotional Stressors

Psychological and emotional stressors are encountered on a regular basis and generate a state of unpleasant arousal. Common stressors include occupational pressures, academic demands, major life events (both positive and negative), financial stress, and bereavement (see Table 29.1). According to a 2020 survey conducted by the American Psychological Association, the three most common sources of stress among Americans included inflation (83%), future of our nation (76%), and violence and crime (75%), work (63%), and police violence toward minorities (55%). Additionally, the majority of Americans (70%) do not think people in government care about them and 62% agree the nation's future looks bleak. The stress caused by the pandemic has had lasting effects including health care, pandemic-related

TABLE 29.1 Sources of Stress

Physiologic stressors	Psychological/emotional stressors
• Autoimmune disorders	• Birth of child
• Cancer	• Caregiving
• Chronic obstructive pulmonary disease	• Change in health status
• Dementia	• Death of close family member or friend
• Diabetes	• Diagnosis of terminal illness
• Organ failure (such as heart, renal, or respiratory failure)	• Divorce
• Myocardial infarction	• Environmental emergencies
• Acute and chronic pain	• Failing an examination
• Traumatic injury	• Finances
	• National events
	• Loss of job
	• Marriage
	• Moral distress
	• Moving
	• Parenting
	• Politics
	• Physical disability
	• Relationship problems
	• Social unrest
	• Spiritual distress
	• Violence

stressors, discrimination and inequities, and the national mental health crisis.[13]

Psychological stress can be acute or chronic. A situation or event perceived as threatening may trigger an acute stress response. This can be a threat that, in fact, poses a danger to an individual's safety (such as a house fire or an automobile accident), but it can also be an emotionally traumatic event (such as the death of a close friend or family member). Chronic psychological stress is a long-term state associated with exposure to consistent stressors such as difficult or abusive relationships, ongoing occupational stress, or financial stress.

Types of Stress

In general, unhealthy stress is categorized as acute stress, episodic acute stress, and chronic stress. The source of all three types of stress can be physiological or psychological/emotional:

- *Acute stress:* Acute stress is, by far, the most common type of stress and typically occurs for a short period of time. It usually occurs in reaction to a perceived demand, threat, or pressure. Resolution of the perceived demand leads to cessation of the stress response and reengagement of the parasympathetic nervous system.
- *Episodic acute stress:* This is a type of acute stress that occurs with some regularity or frequency. Episodic stress often occurs when individuals have self-imposed pressure (e.g., taking on unrealistic assignments beyond what is typically or reasonably expected) and external demands for one's attention. These individuals may always be in a hurry and irritable. Constant worry is another form of episodic acute stress.
- *Chronic stress:* This type of stress represents a perpetual or sustained demand, threat, or pressure that is particularly harmful to health because it wears on individuals continuously. It can stem from long-term stressors such as discrimination, food insecurity, and exposure to interpersonal violence. Chronic stress is often associated with a loss of hope that the situation can improve and can lead to adverse physical and psychological consequences across the life span.

Cognitive Appraisal

The activation of the stress response cascade depends upon an individual's cognitive assessment (i.e., cognitive appraisal) of the situation and the perceived threat level. This is a complex, nonlinear process because multiple variables are involved. Cognitive appraisal represents a process of sorting information to derive meaning and is the underlying factor in how an individual will respond to a stressor.[14] Cognitive appraisal occurs in two phases. The first phase is primary (or initial) appraisal of potential harm to self or a loved one's well-being, self-esteem, or personal values. The next phase is a secondary appraisal involving the evaluation of resources available to overcome, reduce, or eliminate the stressor. This phase also determines to what extent the problem is controllable. A number of factors, such as level of education, past life experiences, current coping style, values, expectations, beliefs, self-efficacy, worldviews, and engagement affect the cognitive appraisal process.

CONSEQUENCES

Although the acute stress response is a normal physiological response that has provided evolutionary benefits, chronic stress has profound effects on health. Chronic stress results in the continuous activation of the sympathetic nervous system (SNS) and eventually produces negative outcomes across multiple body systems, leading to several chronic health conditions.[6,12]

- **Central nervous system:** Chronic stress affects cognitive function, including headaches, nervousness, irritability, problems with decision-making, insomnia, memory problems, confusion, anxiety disorders, and depression. Prolonged release of corticosteroids can also lead to stress-induced damage to the hippocampus, which can affect long-term memory.
- **Cardiovascular system:** Chronic stress results in excessive activation of the SNS and in long-term exposure to catecholamines. This increases heart rate and blood pressure and can lead to cardiovascular diseases such as hypertension, atherosclerosis, cardiac arrhythmias, myocardial infarction, or stroke. Furthermore, individuals with preexisting cardiovascular disease are particularly at risk for exacerbation of the condition when exposed to prolonged stress.
- **Immune system:** Excessive and long-term exposure to cortisol has been shown to decrease white blood cells, leading to stress-induced immunosuppression that places the individual at greater risk for infections, autoimmune disorders, and cancer. There also appears to be a correlation between the stress response and immune-based conditions, but research in this area continues to evolve.
- **Musculoskeletal system:** The stress response is associated with muscle tension as a way to protect against injury. Chronic stress can result in overly taut muscles over a long period of time, leading to pain and discomfort, particularly in the head, neck, and shoulders. Protracted muscle tension of both the head and the neck are contributors to tension and migraine headache. Nervous tics may also develop with chronic stress because of muscle tension.
- **Gastrointestinal system:** Individuals under chronic stress may experience a number of gastrointestinal problems associated with excessive excretion of catecholamines and cortisol. Gastritis, ulcerative colitis, irritable colon, and diarrhea have been linked to chronic stress, as have obesity and eating disorders.
- **Integumentary system:** The hair, skin, and nails may be affected by chronic stress. Elevated stress over time may cause excessive hair loss. There may be skin problems that are exacerbated by stress, including acne, eczema, and psoriasis. There may also be stress-related ulcers in the mouth from dry mouth and cold sores.
- **Sexuality and reproduction system:** Chronic stress affects reproductive health in both men and women. In men, reduced sex drive, reduced testosterone production, reduced sperm production, erectile dysfunction, and impotence occur. Among women, excessive stress may be associated with menstrual cycle disorders, dysmenorrhea, and exacerbation of menstrual symptoms (cramping, fluid retention

and bloating, and irritability) or menopausal symptoms (irritability, mood swings, and hot flashes).

RISK FACTORS

Populations at Risk

Individuals across all population groups are at risk for physical and psychological stress, however, stress is not distributed equally across populations. People who experience higher rates of stress include racial and ethnic minorities, gender and sexual minorities, those with lower socioeconomic status, single parents, and women. Furthermore, a large body of evidence has demonstrated that adverse childhood experiences (ACEs; e.g., experiencing abuse or neglect, witnessing violence) are linked with lasting negative effects on health and well-being as a child grows into adulthood.[15]

Infants and Children

Research on children's perception of stress is based on age and developmental stages and the child's level of self-efficacy and control. Self-efficacy and control are learned over time. An infant is not able to cope with stressors of hunger, pain, or fear because of their motor and cognitive functioning, which has not developed. As they mature, they start to learn coping skills. Children who experience maltreatment are at risk for poor emotion regulation and exaggerated expression of negative emotions in response to stress.[16] A child's coping style is influenced by their parents/caregivers but they also make their own independent decisions regarding, specifically, avoidance coping.[17]

Adolescents

Adolescence is a time of psychosocial, emotional, cognitive, and moral development during a period when teens are also being given more freedom to make decisions in their personal lives. The hormonal changes associated with puberty include interactions among the hypothalamus, pituitary, and gonads, resulting in changes in body appearance (e.g., pubic hair development, acne, increased perspiration, etc.) and mood. Although these changes are a part of normal development, the adolescent years can be challenging. Moreover, during the COVID-19 pandemic, adolescents had to cope with an unprecedented amount of loss and uncertainty as their academic and social interactions completely changed. As a result, many adolescents experienced increased depressive symptoms, negative mood, loneliness, and poor academic adjustment.[18] Adolescence is characterized by the development of formal operations and more formalized abstract thinking ability. Adolescence can be a risky period because the brain is still developing, and critical thinking skills are not fully formed. This, coupled with the increased autonomy of adolescence, places adolescents at increased risk for ineffective coping and poor decision making.[18]

Older Adults

Although older adults have the advantage of a lifetime of coping experiences, a disadvantage for many is that social support may decrease and their circle of friends and experiences may become smaller, especially as they experience physical and psychological changes associated with aging. These physical and psychological changes affect resilience as health conditions effect immune and other body systems. Mobility and cognition can change to a degree causing inaccurate appraisal of events and ineffective coping actions. They may use ineffective coping that is not matched to the level and duration required. Among older adults with varying levels of chronic stress, positive problem-solving coping strategies are associated with lower levels of depressive symptoms.[19]

Individual Risk Factors

Risk for Psychological Stress

There are many sources of psychological stress on individuals. Some of the most common situations placing individuals at risk for stress include problems with interpersonal relationships, strained family relationships, financial strain, occupational stress, and food insecurity to name a few.[20] Other sources of increased risk of stress are in individuals with chronic health conditions or who are in caregiving roles, for example for a loved one with dementia or terminal illness.[21]

Risk for Physiologic Stress

Individuals with a significant injury or illness likely experience an activation of the sympathetic nervous system (i.e., stress response). Examples are those who are in acute life-threatening states (such as traumatic injury, cardiovascular compromise, organ failure) or those who have chronic conditions (such as cancer, heart failure, or chronic pain).

ASSESSMENT

Nurses learn about an individual's perceived stressors and coping responses through a detailed history and examination. The priority of assessment should be an evaluation of signs and symptoms of stress, coping strategies, and the association to disease. Stress signs and symptoms and disease pathologies manifest in a variety of ways and vary in severity. Nurses should recognize individuals who are experiencing a challenging or threatening stress response so that appropriate interventions can be initiated. There are reliable questionnaires for assessing stress symptoms and coping actions. There are also assessments for tobacco, alcohol, substance abuse, anxiety, and depression that may be appropriate.

History

When conducting a history, the nurse queries about the past and current state of health (past medical history, current conditions, and current medications), family history, psychosocial history, and stress symptoms associated with body systems. Clues about the presence of stress are often identified in the psychosocial component of the history. Specifically, ask about past or current mental health diagnoses, major life events associated with psychological stress, such as a death, loss of job, or illness, and current sources of stress and preferred coping methods. Common symptoms of stress include irritability, nervousness, anxiousness, feeling overwhelmed, or feeling depressed or sad. Additional manifestations of stress may be reported as

unexplained abdominal pain or indigestion, headaches, insomnia, fatigue, restlessness, lack of concentration, dizziness, excessive sweating, sweaty palms, back pain, tight shoulders or neck, skin eruptions, hair loss, hyperventilation, palpitations, and chest tightness.

A history should also include data regarding the individual's appraisal of the stressor and what coping strategies have been used—both effective and ineffective methods. Recall that the appraisal process that provides the meaning or perception of a stressor is developed from several factors including past experiences, internal needs, external needs, ability to acknowledge the problem, cognitive abilities, values, expectations, culture, social supports, and their perceived control over the situation.

It is also important to ask the individual how they have coped with stressful events in the past. For example, did they seek support from another person? Did they turn to alcohol or other substances? Additionally, learning the individual's perception of the effectiveness of these coping behaviors helps to gain insight into the strengths and/or weaknesses of the individual's coping patterns. A number of standardized tools are available to formally assess stress and coping responses (Box 29.1), although nurses may find it more useful during a health history to ask open-ended questions regarding sources of stress and methods of coping.

Examination

Examination findings associated with stress are usually consistent with sympathetic nervous system activation. In the acute phase, these signs may include elevated heart rate, irregular heart rate, elevated blood pressure, increased respiratory rate and depth, excessive sweating, dilated pupils, and muscle tension. Such findings may not be as evident when stress is chronic. Assessment in cardiac, respiratory, musculoskeletal, and neurologic systems should be done to look for stress-related pathologies and for acute manifestations of stress overload. For example, auscultation may reveal heart palpitations and increased heart rate, and blood pressure monitoring may show hypertension. An assessment of cognitive functioning is also appropriate as part of the examination. General observations such as personal appearance, grooming, facial expressions, and affect aid the nurse in determining cognitive function (which affects the ability for effective coping).[22] Findings associated with maladaptive coping behaviors may include anger, anxiousness, sadness, or hopelessness. Evidence of adaptive coping behaviors includes insight and engagement with the primary appraisal and the development of a coping plan. Willingness to use coping strategies or problem-solving techniques is also consistent with positive coping.

BOX 29.1 Coping Measurement Instruments

- Miller Behavioral Style Scale
- Mainz Coping Inventory
- Brief Cope Inventory (BCI)
- Billings and Moos Coping Measures
- Ways of Coping Questionnaire (WCQ)
- Coping Strategy Indicator (CSI)
- Life Events and Coping Inventory (LECI) (children)
- Adolescent Coping Orientation for Problem Experiences Inventory (A-COPE) (adolescents)
- Life Situations Inventory (LSI) (middle and older adult)
- Stress and Coping Process Questionnaire (SCPQ)
- Coping Inventory for Stressful Situations (CISS)

CORE COMPETENCIES

Stress and Coping

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to stress and coping.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to stress.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to stress and coping.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to stress and coping.

CLINICAL MANAGEMENT

Nurses in all areas of practice should be able to recognize stress in patients (and their families) and help them identify high-risk stressors. The aim of clinical management is to implement effective strategies that reduce the stress. Furthermore, nurses help patients support the foundation of adaptive coping strategies and assist the patient in finding new resources, building self-efficacy, and reinforcing or guiding development of new ways for coping. An organizing framework for the concept of stress and coping that nurses can use in their practice is shown in Fig. 29.3. This framework starts with an event and ends with an outcome. In the framework, there are antecedents that include individual characteristics, family, community, and environment. The personal appraisal and reappraisal assist the individual in making meaning of the event and determining the magnitude/effect of the stressor. Psychological and physiological stress responses occur and based on the appraisal or magnitude of them appropriate coping actions are taken.

Primary Prevention

Primary prevention focuses on preventing illness as a result of stress. Thus, the goal is to promote effective coping, health, and well-being. Settings for primary prevention strategies that focus on wellness and prevention of stress-related disease and disability include the workplace, schools, senior centers, community wellness centers, primary healthcare clinics, and medical homes. Maintaining good health through proper nutrition, regular physical activity, sustained positive personal relationships and social support networks, and cultivating a positive sense of self are all common primary prevention strategies for stress-related outcomes. Health education for stress prevention is aimed at helping the individual to understand the components of a healthy lifestyle, the relationship of chronic stress and disease, and to learn effective preventative coping strategies that can be used when needed.

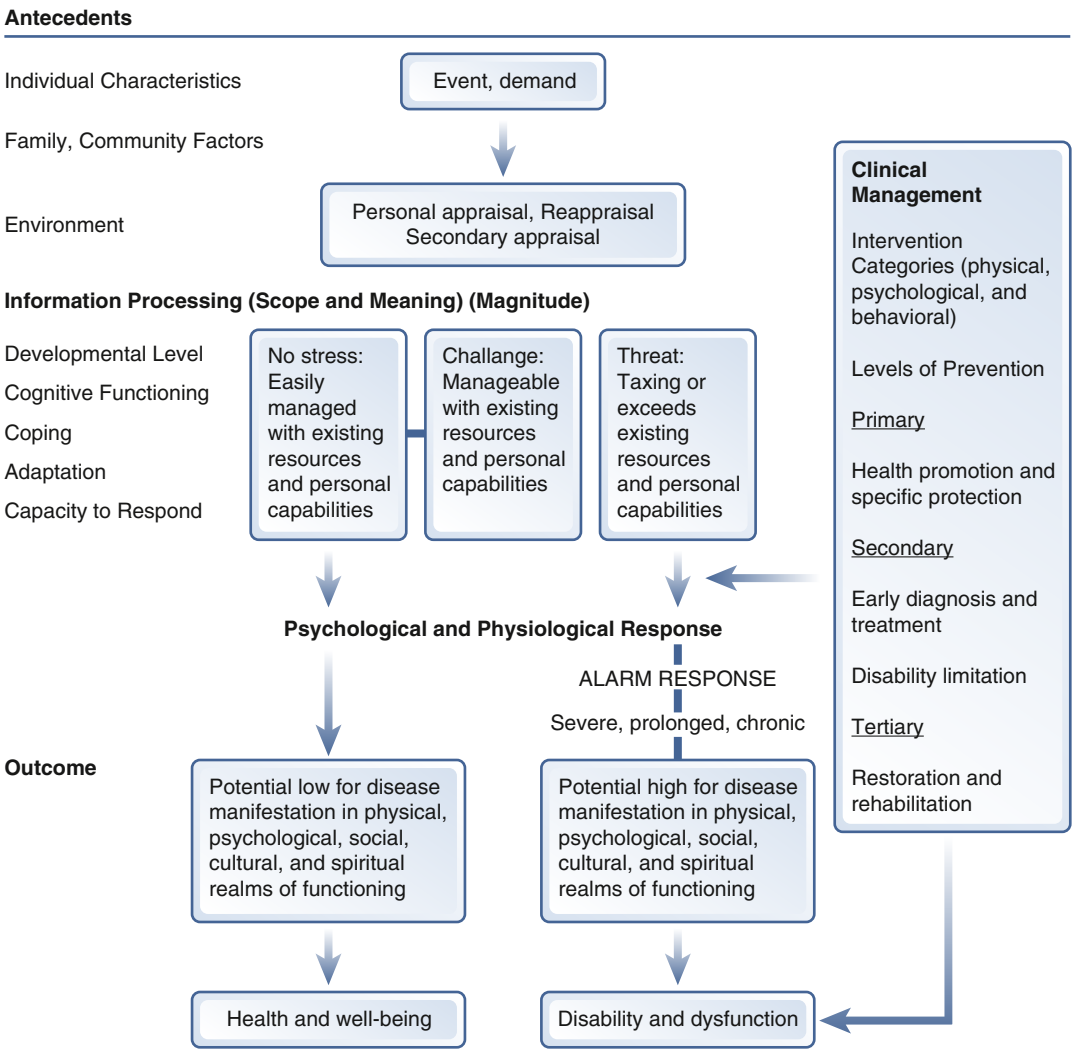

Fig. 29.3 Organizing Framework for Stress and Nursing Practice.

Secondary Prevention (Screening)

There are currently no national recommendations for stress screening for general or designated populations. However, there are recommendations for certain negative physical and mental health conditions that can result from acute or chronic stress and maladaptive coping such as substance abuse and depression. A number of stress screening tools are available for use in clinical practice; some of these are presented in Box 29.1.

Collaborative Interventions

The goal of clinical management for an individual experiencing stress is to restore the individual to optimal function. Specific interventions are geared toward reducing the actual or perceived threats (if possible), and reinforcement of perceived control over the stressor by adopting positive coping strategies. For patients experiencing acute stress associated with a life-threatening physiologic insult (such as trauma, shock, or sepsis) interventions are geared toward stabilizing the patient. The collaborative interventions discussed in this section focus on measures to assist individuals who are physiologically stable but at risk for illness or injury because of acute or chronic stress.

Nurses have a role in helping patients adapt positive coping strategies and discouraging or redirecting the individual from maladaptive coping strategies.

Categories of Coping Strategies

Coping strategies fall into three broad categories: problem-focused, emotion-focused, and meaning-focused coping.[4,5] Although individuals typically apply a combination of coping strategies as a response to stress, problem-focused coping tends to be more effective than emotion-focused or meaning-focused coping.[23]

Problem-focused coping. Problem-focused coping involves generating solutions to reduce or eliminate the identified stressors. A cognitive appraisal of the situation is conducted (including if the stressor is one that has been faced before or is a new type of stressor), and then action is taken to manage or change the situation or circumstance associated with the stressor. The coping action is aimed at eliminating or reducing harm from the stressor. For example, if a woman is experiencing significant stress at work because she has multiple projects with similar deadlines and knows she is unable to meet all the

obligations, a problem-focused coping strategy might be to schedule a meeting within her department to develop a plan to obtain additional support and resources so all projects can be completed or to negotiate alternative deadlines.

Emotion-focused coping. Emotion-focused coping emphasizes the regulation of emotional response (such as anger, fear, or anxiety) that occurs in a given situation. Actions are directed at maintaining emotional control through self-regulating thinking and behavior. An example is going for a run, talking with a friend about how one is feeling, and journaling. No attempt is made to change the stressor—rather the focus is on controlling the emotional response to the stressor.

Meaning-focused coping. In meaning-focused coping, the individual draws on values, beliefs, and goals to modify the personal interpretation and response to a problem. The foundation of meaning-focused coping is cultural beliefs, values, ethical foundations, education, and life experiences with a goal of confronting feelings and biases.[5] In meaning-focused coping, the action taken is to start a conversation with a reliable individual (friend or professional) to make meaning of the situation in order to understand one's responses and personal biases and find ways to reframe or modify the personal interpretation and response.

Common Positive Coping Strategies

Effective coping involves positive behavior change or adaptation to address the underlying stressor. Coping strategies that can effectively help manage stress to the benefit of an individual's health are referred to as positive coping strategies. The effectiveness of strategies is highly individualized—and most people apply more than one. Ideally the coping strategies are matched to the severity, duration, situation, and context of the stressor. If coping has been successful in the past and there is similarity of circumstances use of similar coping action is more likely to result in a positive outcome.[14] The most common coping mechanisms include listening to music, exercise, praying, meditation, and yoga.[13] Table 29.2 presents many common positive coping strategies.

TABLE 29.2 Positive and Maladaptive Coping

Positive coping strategies	Maladaptive coping behaviors
• Art therapy	• Avoidance coping
• Counseling	• Attacking or bullying
• Distraction and diversion activities	• Compartmentalizing
• Education	• Denial
• Massage	• Dependency
• Meditation	• Displacement
• Music therapy	• Dissociation
• Physical activity	• Emotional outbursts
• Praying	• Excessive eating
• Relaxation techniques	• Regression
• Social support	• Rationalization
• Spiritual resources	• Self-harm
• Yoga	• Sensitization
	• Social isolation/withdrawal
	• Substance use
	• Violence

Education. Education regarding the situation and alternative coping measures is a powerful tool to increase self-efficacy and control.[14] For example, a patient with cancer who is educated about treatment alternatives and is given a choice of treatment will feel more in control of the situation and stress will be reduced.

Social support. Social support represents a group of strategies that involve gaining support from others. Social support leverages the power of relationships with a network of close friends, family members, community groups, spiritual groups, and support groups organized by specific problems, such as cancer survivors support groups. Having the support of others assists with appraisal, self-regulation of emotions, and feeling of confidence and strength[24,25] and helps to build resilience. Nurses can assist by providing information about resources and support groups in the local community or helping to develop these resources if they are not present.

Exercise. Exercise is a very powerful coping strategy that includes a variety of activities that lead to aerobic movement. Exercise can be implemented in various settings, including a hospital, community center, or home. Exercise should be individualized but can include any cardiovascular–aerobic activity, such as walking, running, swimming, and cycling. The benefits of exercise include relief of tension, reduction of stress, relaxation, and enhanced sense of well-being.[23,24] Approximately half of Americans engage in exercise to cope with stress.[13]

Therapeutic lifestyle change. A therapeutic lifestyle change (TLC) collaborative intervention is aimed at promoting adaptation, coping, and support to promote positive changes that lead to checking of stress or of decreasing severity levels. The collaboration involves exercise, dietary, and counseling professionals who work with the nurse to develop a TLC treatment plan. Topics and skills include self-talk; muscle relaxation; exercise; dietary approaches; and avoiding tobacco, alcohol, and drugs. TLC incorporates aspects of motivational interviewing to motivate individuals to change.[24]

Music therapy. Another positive coping strategy is music therapy. Music (particularly slow, quiet classical music) can have a physiologically relaxing effect through the reduction of heart rate, blood pressure, and reduction of stress hormones. Stress reduction through music therapy has been demonstrated in a number of settings and population groups. It helps to reduce stress in disabled children, reduce anxiety in patients in the perioperative environment, reduce depression and increase self-esteem among older adults, and reduce emotional distress among patients with cancer.[26]

Relaxation strategies. Relaxation strategies are among the most effective coping strategies for stress management. The goal of relaxation strategies is to achieve a relaxation response—that is a state of physiologic and psychologic rest. Specifically, the relaxation response results in a reduction in SNS activity which leads to reductions in heart rate, respiratory rate, blood pressure, muscle tension, and a state of reduced brain activity. There are many types of relaxation strategies. Some of the more common relaxation strategies include guided imagery, massage, meditation, relaxation breathing, yoga, Tai Chi, and Qigong.[23,27]

Complementary and alternative therapies. Another group of interventions effective for stress reduction includes complementary and alternative medicine strategies. Strategies listed as possibly effective for relieving stress include acupuncture, herbals/botanicals, and aromatherapy.[28]

Ineffective and Maladaptive Coping Responses

Collaborative care also includes the identification of maladaptive coping responses with the intent to redirect the patient toward positive coping responses. Ineffective and maladaptive coping behaviors are those that do not adequately address the underlying problem. An ineffective coping response occurs when an appropriate coping mechanism is used but may be insufficient for the severity of the stressor. For example, an individual who is experiencing serious financial strain can take a course on personal finance (a positive strategy) but the gains made in education alone may not be sufficient to overcome significant debt.

Maladaptive coping responses include those that ignore the underlying cause of the stressor, and many actually lead to other problems. Common maladaptive coping responses include the use or abuse of alcohol and other substances, smoking, excessive eating, denial, withdrawal, or avoidance. Maladaptive behaviors may increase the risk for negative outcomes. For example, in one study among patients with chronic Lyme disease, behavioral disengagement was associated with decreased emotional well-being, whereas positive reframing was associated with positive emotional well-being.[29] Although avoidance, as a coping strategy, can be somewhat useful in specific situations that are perceived as short term and uncontrollable, long-term avoidance can lead to increased emotional distress, longer recovery times, less effective problem solving, and other maladaptive responses.[24] However, not all forms of disengagement are considered maladaptive. In a study of caregivers of children with chronic illnesses, those high in distraction (e.g., self-care activities) reported higher well-being, lower depression, and lower stress.[30] Many maladaptive coping responses are presented in Table 29.2.

Pharmacologic Agents

Although there are no medications used to prevent stress or treat stress directly, many types of medications are used in the management of stress-related conditions, particularly conditions that coexist or are caused by stress. Drugs that act on the central and peripheral nervous systems, such as anxiolytics and hypnotics, antidepressants, antianxiety agents, psychotherapeutics, muscle relaxants, antimigraine agents, and narcotic pain medications, may be used. Selective serotonin reuptake inhibitors and tricyclic antidepressants may be used for individuals with chronic stress and depression. Some of the most common drugs are for relief of muscle tension and pain associated with stress.[31]

INTERRELATED CONCEPTS

The concept of stress and coping has multiple interrelated concepts featured in this textbook and shown in Fig. 29.4. **Anxiety** is closely aligned with stress because this is a typical feeling when pressure occurs. Anxiety can be useful for mobilizing resources to cope with the stressor or can lead to overt mental health illnesses when the stressor is severe and/or sustained.

Functional Ability and **Family Dynamics** are shown as interrelated concepts because these are often associated with stressors. Many of life's most significant stressors are generated from problems managing life events and challenges within relationships. Another key interrelated concept is the health and illness concept of **Cognition**. Adequate cognitive skills are needed in order to perform an appraisal of an event because of the need to accurately process information. Chronic stress, as discussed earlier, can lead to cognitive impairment. Many other consequences of chronic stress are represented by the concepts **Mood and Affect**, **Perfusion**, **Sexuality**, **Sleep**, and **Immunity**.

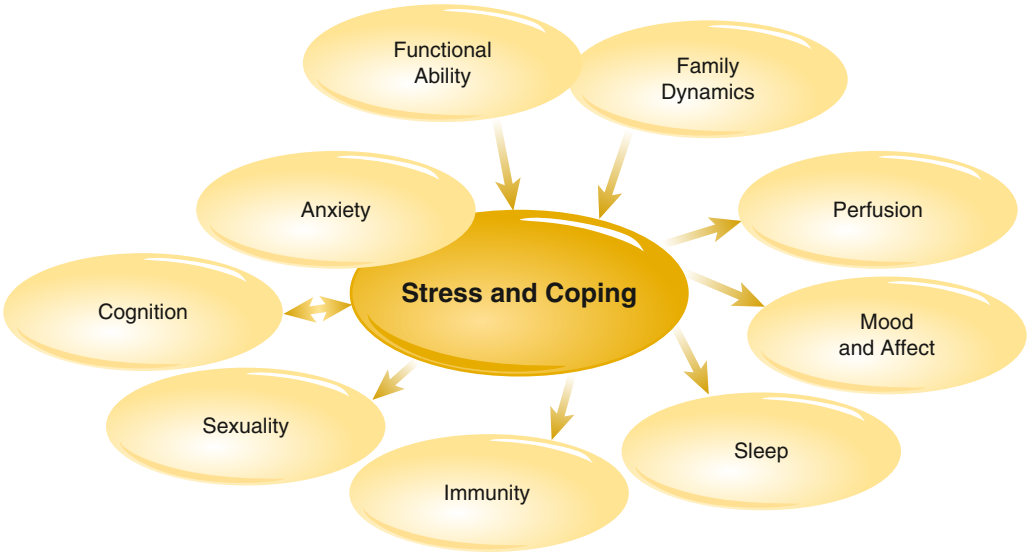

Fig. 29.4 Interrelated Concepts of Stress and Coping.

BOX 29.2 EXEMPLARS OF STRESS-RELATED DISORDERS

- Acne
- Anxiety disorders
- Autoimmune disorders
- Cardiac arrhythmias
- Coronary artery disease
- Depression
- Dysmenorrhea
- Dyspepsia
- Eating disorders
- Eczema
- Erectile dysfunction
- Fatigue
- Fibromyalgia
- Hypertension
- Immunodeficiency
- Insomnia
- Irritable bowel syndrome
- Low back pain
- Stroke
- Tension headache

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CLINICAL EXEMPLARS

Clinical exemplars of stress-related disorders are presented in Box 29.2 and represent conditions that can result from chronic stress. Disorders that result from, or are exacerbated by, chronic stress occur because of sustained exposure to catecholamines. A number of variables affect the onset and severity of stress-related disorders and include the type of stressor, the perception of the stressor, coping skills, and length and severity of the stress. A few classic and common exemplars are briefly discussed.

Featured Exemplars

Anxiety Disorders

Anxiety disorders area maladaptive responses to stress that ranges from mild anxiety to panic disorder. Anxiety can be acute or chronic—consistent with the stressor involved. Anxiety affects individuals across the life span and represents one of the most common mental health disorders among pediatric, adolescent, and adult populations. Individuals who develop anxiety disorders tend to have impairments in social, family, and occupational relationships. Often, individuals with anxiety disorders benefit from professional psychological support (e.g., talk therapy) and pharmacologic anxiolytics and/or antidepressant agents. Stress reduction activities and positive coping strategies can help augment these formal treatments.

Tension Headache

Tension headaches are the most common type of headache among adults and are associated with moderate to severe stress causing prolonged muscle tension. It is described as a bilateral, dull, bandlike, or pressing pain that builds up gradually and has a prolonged duration. Tension headaches can occur periodically or several days in a row, lasting from 30 minutes to days. This type of headache is worsened by noise and light. The severity of symptoms tends to be positively correlated with the frequency of occurrence of the stressor.

Hypertension

Hypertension is a chronic elevation of blood pressure. This is one of the most common manifestations of stress related to catecholamine effect on the sympathetic nervous system. Catecholamines cause peripheral vasoconstriction and an increased rate and force of cardiac contraction, leading to the elevation of blood pressure. Hypertension is most commonly diagnosed among adults, although hypertension among young adults and children is on the rise. Stress associated with hypertension can be minimized by engaging in healthy lifestyle behaviors such as regular physical activity and a well-balanced diet low in sodium.

Insomnia

Insomnia represents a group of disorders associated with a disruption of sleep. Acute and chronic stress is one of the leading causes of insomnia. Insomnia is described as the inability to fall asleep or stay asleep. The effects include daytime sleepiness, generalized fatigue, irritability, and cognitive problems. Chronic insomnia is associated with multiple health-related conditions. Insomnia can affect individuals of all ages, but it is more commonly associated with adults and older adults. In addition to stress reduction via positive coping strategies, good sleep hygiene is imperative. Consistent bedtime routines with cessation of electronic screens at least 1 hour before bedtime can support natural circadian rhythms and contribute to improved sleep quality and duration.

Irritable Bowel Syndrome

Irritable bowel syndrome (IBS) refers to a group of symptoms associated with discomfort in the large intestine, including cramping pain, bloating, gas, diarrhea, and/or constipation. Because there is no identified pathology, IBS is not considered a disease but, rather, a functional syndrome with no known cause. However, stress has been identified as a common trigger of IBS. It affects an estimated 20% of the population at one or more times during their lifetime. IBS can occur at any age, but it most commonly affects adults and older adults and affects women more often than men. Identifying symptom triggers and patterns can be a very helpful strategy for developing targeted prevention efforts and effective coping strategies.

Eczema

Eczema is a chronic condition associated with chronic inflammation of the skin. It presents as erythema, scaling, itching, and weeping sores. This condition is thought to be an autoimmune condition that is exacerbated by stress. In other words, eczema is not caused by stress, but the condition is made worse by stress. It occurs among individuals of all ages and affects men and women equally. This condition can be both physically and psychologically distressing. Skin hydration, avoidance of triggers, and positive coping practice can minimize eczema-related distress.

CASE STUDY

From MariaDubova/iStock/Thinkstock

Case Presentation

Minh Nhung is a 43-year-old recently divorced female who has two teenage daughters, aged 18 and 16 years. She is employed full-time as an office assistant and regularly has difficulty paying her bills. Minh's ex-husband is an alcoholic and is involved with her daughters but cannot be relied on for financial assistance. She lives in an older home in a low-income neighborhood. Her aging and widowed mother, who lives a few blocks away, is in the early stages of Alzheimer disease and needs regular assistance. Ms. Nhung is the main caregiver for her mother.

A number of recent events have been challenging for Minh. Her 16-year-old daughter is 7 months pregnant and she knows she will be largely supporting and raising her grandchild. She also recently had an intense argument with her oldest daughter about attending college—something she supports but cannot afford. In addition to all of these issues, Jennifer's mother fell and broke her arm. She is now trying to meet the increasing care needs of her mother.

She is feeling highly anxious and is experiencing difficulty sleeping. She has had intermittent diarrhea and has become highly irritable, leading to conflicts at work with her coworkers. Minh also began experiencing headaches. Fearing she had something seriously wrong with her (like a brain tumor), she went to an urgent care clinic. After a brief visit focusing on her headache, she was told not to worry because she was "only experiencing a tension headache" and her blood pressure was slightly elevated. She was advised to follow-up with her primary care provider (PCP). Minh was relieved to learn she did not have a brain tumor but has no intention of seeing her PCP for the headaches as she feels she doesn't have the time or money to do so.

Case Analysis Questions

1. In what ways is Minh at risk for poor health outcomes because of her situation?
2. What questions could the nurse ask to assess Minh's appraisal of her current stressors and her coping strategies?
3. What nursing interventions could be implemented to enhance Minh's adaptive coping mechanisms?

CASE STUDY

Case Presentation

Carl Wendell is a 13-year-old male who has type 1 diabetes that is being followed in your clinic. His parents are going through a divorce and now Carl lives with his mother and four younger siblings in a small apartment. His mother is unemployed and the family has very limited resources. When the nurse meets with Carl and his mother, Carl appears angry, withdrawn, and tearful. The nurse observes to Carl that he seems distressed and asks about his current stressors. Carl responds that it's not fair that he has to take shots every day and he feels different than his friends. He wanted to try out for the soccer team but they don't have enough money for the equipment and fees. Carl also states that he has to come home right after school to take care of his younger siblings when he would rather be playing with his friends. Carl's mother states that she knows it's been hard on Carl but she is doing the best she can. Although Carl's mother is present, she appears to be lacking in empathy and engagement in the discussion

Case Analysis Questions

1. What factors place Carl at an increased risk for adverse physical and mental health outcomes?
2. What nursing interventions could support Carl and his mother in identifying adaptive coping mechanisms?

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CONCEPT 30

Mood and Affect

Richard A. Pessagno

Mood and affect is a psychosocial concept that underlies all other concepts in the significant effects that it has on health outcomes.[1] The purpose of this concept presentation is to enable the generalist practice nurse to have an understanding of mood and affect, develop an awareness of the expected variability or range of the mood spectrum, and recognize affective instability so that these patients can be managed safely and referred to advanced practitioners for evaluation and treatment of any possible mood spectrum disorders.

DEFINITION

The term *mood* is defined as *the way a person feels,* and the term *affect* is defined as *the observable response a person has to his or her own feelings.*[2] The term *euthymia* is used to describe normal, healthy fluctuations in mood. The mood spectrum is a continuum of all possible moods that any person may experience. Mood spectrum disorders disrupt the individual's ability to function normally, and individuals with mood spectrum disorders are at increased risk for many problems, such as health status impairment, addiction, and potential for violence.[1] These disorders should only be diagnosed by qualified advance practice nurses, social workers, psychologists, physicians, or other qualified mental health professionals who have expertise and training in diagnosing medical or psychiatric related problems. Diagnosing a mood spectrum disorder is not within the scope of practice for the nurse generalist.

Because mood is a subjective experience of feelings, and affect is an objective reflection of feelings, the evaluation and description of mood is often done in terms of affect,[1] and generalist practice nurses are qualified and expected to assess affect. In particular, nurses must be able to recognize unstable affective states known as *affective instability.*[3] Signs of affective instability, such as crying, rage, euphoria, and blunting, indicate the need for further assessment because such individuals may have a mood disorder. *Functional status* describes the individual's ability to perform activities of daily living and to realistically solve problems of daily living;[4] it is used as one indicator to determine the severity of a mood spectrum disorder.

SCOPE

From the simplest perspective, the scope of mood and affect can be thought of in terms of being low or depressive range, normal range, and elevated range. There is considerable evidence to support a conceptual model of mood and affect in a single spectrum of possible affective states.[3] Normal mood (also referred to as euthymia) actually represents a range of expected mood cycles—normal happiness and normal sadness—and is shown in the middle of the spectrum in Fig. 30.1; the curvy line illustrates normal euthymic mood cycling. The amplitude and frequency of euthymic mood cycles may be normally regular or irregular and vary from one person to another.[3]

The low end of the mood spectrum represents mild to moderate to severe melancholy. On the other end of the mood spectrum is mild to moderate to severe mania. As the mood cycles out of the euthymic range in either direction, the functional status decreases proportionately. In extreme mood states, such as severe mania or severe melancholy, the individual may be completely disabled and experience symptoms of acute confusion such as hallucinations and/or delusions. Fig. 30.1 illustrates the full scope of the mood spectrum from extreme melancholy to extreme mania in language consistent with the current generalist nurse paradigm and scope of practice.

NORMAL PHYSIOLOGICAL PROCESS

Regulation of mood is complex and poorly understood, as it involves the integration of multiple brain functions and processes. Mood regulation depends on optimal function of neurons, neurotransmitters, and optimal coordination of several parts of the brain, including the prefrontal cortex, anterior cingulate cortex, and the limbic system. Changes to the function and/or coordination of any of these areas can dramatically affect mood regulation.

Neurotransmitters are chemicals that serve to transmit nerve signals from neuron to neuron and to different parts of the brain, such as the limbic system and prefrontal cortex. Neurotransmitters (especially dopamine, norepinephrine, and

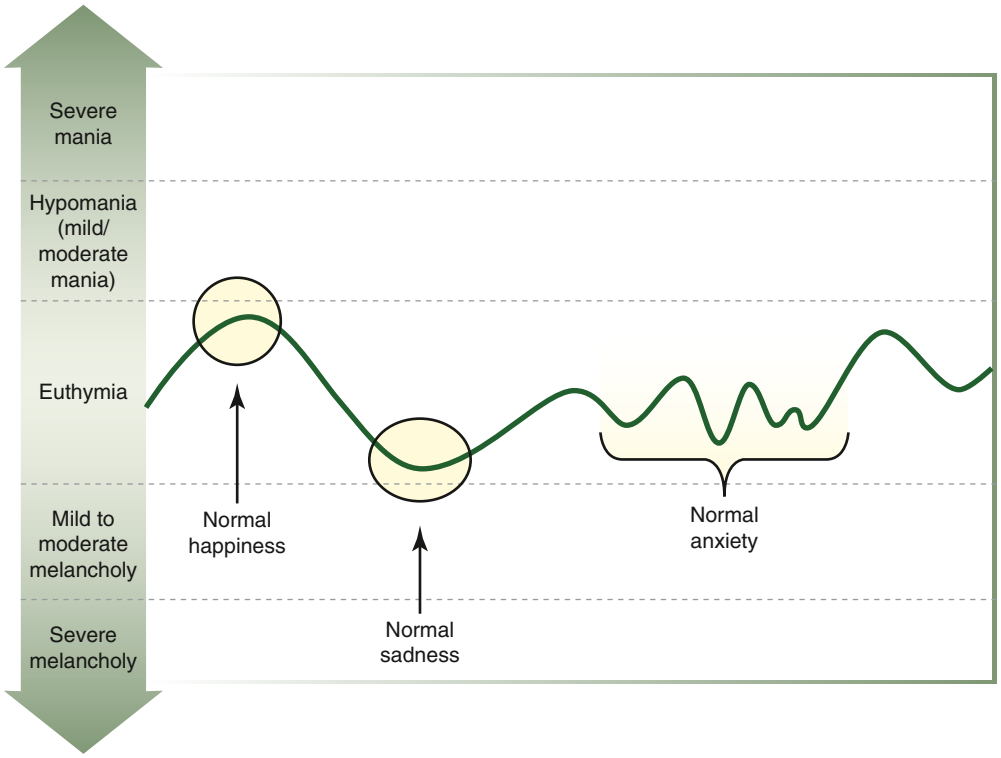

Fig. 30.1 Unitary Model of Affect (Shown Here in Euthymic Range). The *left sidebar* shows the scope of affect from severe melancholy at the lower end to severe mania at the top end. The *green line* depicts normal mood as it cycles within the euthymic range from happiness to sadness and back to happiness. (Adapted from MacKinnon, D. F., & Pies, R. (2006). Affective instability as rapid cycling: theoretical and clinical implications for borderline personality and bipolar spectrum disorders. *Bipolar Disorder, 8*(1), 1–14.)

serotonin) have a powerful role in mood regulation by regulating appetite, sleep, thought, emotion, mood, learning, memory, motivation, and concentration. Excessive or insufficient levels of neurotransmitters are associated with mood disorders and other mental health conditions.

The prefrontal cortex and the anterior cingulate cortex are responsible for judgment, decision-making, problem solving, feelings, and emotional responses.[3] The left half of the prefrontal cortex is involved with the establishment of positive feelings and the right half with negative feelings. The prefrontal cortex also has an indirect role in controlling mood by moderating feelings generated in the limbic structures and having an effect on neurotransmitter release. The limbic system is the area of the brain that is most directly involved in regulation of emotion, particularly the thalamus, amygdala, hippocampus, and cingulate gyrus. The amygdala is a limbic structure that is involved with memories, learning to fear events, and persistent negative thoughts. The hippocampus has a role in the creation and storage of new memories, and it also has a role in a major mood circuit known as the hypothalamic–pituitary–adrenal axis.[3]

Age-Related Differences in Emotional Regulation

Emotional regulation evolves throughout life and is closely linked with growth and development. This section briefly describes the evolution of emotional regulation.[4]

Infants and Children

There is a lack of agreement regarding at what point mood is experienced by infants. Mood can only be surmised based on what is observed. Initially, this is limited to facial expressions and behavior and is influenced by an increasing awareness of the environment. For example, infants initially smile beginning at approximately 6 weeks of age, often in response to a parent's smile; this response becomes more diverse as the child experiences positive feelings regarding things he or she sees and experiences. Thus, an infant's expression of emotion is largely regulated by the degree of physical comfort and by cues from adults.

Emotional understanding emerges in toddlers as language, cognitive, and social development. Emotional regulation is thought to be associated with the child's ability to recognize the emotions of others and to mimic the behaviors he or she has observed and/or experienced. For example, toddlers will attempt to alleviate the distress of another by caressing or hugging. Preschool children continue to develop emotional regulation skills primarily based on observations of their parents or primary caregivers. An internalization of cultural norms regarding how they are expected to behave when they are feeling a certain way also becomes more developed.

The ability to self-regulate emotion becomes more evident during the middle childhood years. At this age, children

understand the variety of verbal and nonverbal responses available for the expression of feelings. School-age children may be more willing to express feelings of sadness or anger toward a parent than toward a peer, and they develop an understanding of emotional states of others and the complexity of context in which they occur.

Adolescents

By the time an individual reaches adolescence, an array of skills to regulate emotions have been developed. Adolescents are highly aware of social circumstances related to emotional regulation. Evidence suggests that adolescents experience more variability in mood states and affect compared with adults. It is unclear if these differences are a result of physiological changes, such as hormonal imbalances, or differences in emotional reactivity or emotional regulation.[5]

Older Adults

Mood regulation in older adults is generally physiologically consistent with what was previously described. However, despite the fact that many older adults experience physical and cognitive decline, there are reports of resilience leading to a sense of well-being. It's thought this difference can be interpreted because often older adults can activate an emotional regulation process that allows them to compensate for any negative stimuli they may experience, such as what was seen during the COVID-19 pandemic.[6]

VARIATIONS AND CONTEXT

Conceptually, mood spectrum disorders occur when the mood cycles downward from the euthymic range into affective states seen as melancholy or when the mood cycles upward from the euthymic range into hypomania or severe mania. There are a large number of medical/psychiatric conditions with diagnostic criteria derived using medical reasoning in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).[7] In medical psychiatry, these conditions are grouped dichotomously as disorders in either the depressive spectrum or the manic spectrum. *Depression* and *mania* are medical/psychiatric diagnostic terms used to indicate the extreme shifts of the mood spectrum disorders.[1] Although this dichotomous model is weakened by evidence supporting a unitary model of mood spectrum disorders,[3] it provides an excellent source for exemplars of the concept. There is a mixed state depression diagnosis that does not fit neatly in the depressive or the manic column because it contains features of both, and it provides useful borderline characteristics for concept analysis purposes. Suicide or suicidal behaviors in general may also be useful for analysis as exemplars.

Depressive Spectrum

Conceptually, depression is characterized by such overwhelming sadness and despair that one feels drained of energy. An individual suffering from depression may feel so sad and empty that he or she becomes incapacitated by a loss of the will to live, and suicidal thoughts may prevail. Caution should be exercised in the use of the word *depression* to avoid misunderstandings for two reasons. First, the word *depression* is commonly misused to describe normal euthymic sadness when there is little or no loss of functional status. Second, depression is a medical/psychiatric diagnostic term, and the clinical psychiatric use of the word *depression* has a variety of diagnostic applications. For clarity, the undiagnosed mood state characterized by sadness, despair, and loss of functional status is best referred to as *melancholy.*

Mania Spectrum

Individuals with mania are recognizable in the nursing paradigm by the presence of euphoric or agitated affective states, and they often suffer from varying degrees of perceptual disturbances as well, such as racing thoughts, grandiose delusions, difficulty concentrating, impulsivity, and lack of insight. Consequently, individuals with mania experience impaired functional status, and behavior associated with mania may be reckless and dangerous.

Another term used as a defining characteristic for some medical/psychiatric diagnoses is *hypomania.* Nurses are expected to be able to recognize hypomania as an unstable affective state. Hypomanic affective states are expansive or agitated and possibly euphoric but to a less severe degree than in mania and with less impairment. Although the individual with hypomania experiences racing thoughts and agitation or euphoria, perceptual disturbances are much less likely in hypomania. To facilitate the assessment of affective instability in the generalist nurse conceptual paradigm, the presence of perceptual disturbances is used to distinguish mania from hypomania.

CONSEQUENCES

The consequences of mood disturbances are significant from both a physical and a social perspective. Patients with mood disorders can be high utilizers of the healthcare system leading to the need for additional resources, and the need for trained professionals equipped to address co-occurring medical and mental health needs among these patients.[8] The activity of various neurotransmitters is also disrupted, particularly the levels of dopamine, norepinephrine, and serotonin. A wide range of interventions aimed at restoring neurotransmitter balance (including psychotherapy, medications, and treatments such as brain stimulation) can be used.

Interpersonal relationships and productivity may be greatly limited by functional status impairment during mood spectrum disorders. Psychosocial variables such as negative life events, personality traits, and individual cognitive styles are associated with mood spectrum disorders.[3]

The most ominous consequence, of course, is the increased potential for suicide. Probably because of increased energy levels, patients on the manic or hypomanic pole of the mood spectrum are at a higher risk for suicide than are those with low energy at the melancholic pole.

RISK FACTORS

Fluctuations within the euthymic range occur normally and even daily among all populations and across the life span. However, although anyone may experience mood spectrum disorders, there are known risk factors. A landmark, broad-based assessment of mood spectrum disorders in the United States was the National Comorbidity Survey Replication (NCS-R) study conducted from 2001 to 2003; this study, based on 9282 interviews, provides a basis for understanding risk factors.[9]

Populations at Risk

According to the NCS-R, the 12-month prevalence of clinically significant depression in the general population was 6.6%, and the lifetime prevalence was 16.2%. The rate of depression among women is two or three times higher than that in men, and the first episode of depression for either gender usually occurs during adolescence or early adulthood. The incidence of depression peaks bimodally, occurring with the highest frequency during the late 20s/early 30s and again during the late 60s.[9]

Individual Risk Factors

Individual risk factors for depression are stress, early trauma, neglect, abuse, family history, comorbid medical and psychiatric disorders, and personality disorders. Comorbid anxiety or substance-related disorders prevail in 75% to 80% of those with depression, and 22% of adults report comorbid substance dependence. Among those who reported no psychological distress, 7% reported substance dependence.[9]

ASSESSMENT

Although generalist practice nurses are not qualified to diagnose mood spectrum disorders, they should be able to recognize affective instability as an outward manifestation of a possible mood spectrum disorder. Affective instability may present as any combination of agitation, sadness, elation, or blunting. Blunting is particularly difficult to recognize because it may not be noticeable immediately; blunting is an absence or diminished presence of any affect, and this should be considered a sign of affective instability. Speech may be monotone during blunting, and responses may be unusually brief. Blunting must not be overlooked because it may mask dangerously unstable affect.

The combined interaction between mood, energy, and cognition results in what is called *affect*;[1] therefore, the recognition of affective instability is facilitated by an analysis of mood, energy, and cognition. The defining characteristics for the Mood and Affect concept in this analysis are derived from the diverse presentations of affective instability that result from the various problematic ways that mood, energy, and cognition interact. The defining characteristics are persistent mood disturbance, functional impairment, and disturbed vegetative functioning (sleep, appetite, and energy). To facilitate assessment, each of these characteristics is discussed individually.

Persistent Mood Disturbance

The assessment of mood is based on the patient's self-report. Occasionally, nurses will infer mood from affect, but this can be misleading because affect is not always congruous with mood. For example, individuals may laugh and cry simultaneously. In any case, persistent mood disturbance may include sadness, melancholy, irritability, lack of interest in normal activities (anhedonia), euphoria, elation, rage, or the lack of any ability to feel emotions at all. Moods should fluctuate normally in the full range of euthymia, but moods should not fluctuate so rapidly or to such extremes or for so long that functional status is disrupted.

The important point that underlies this defining characteristic is the idea of persistence. Anyone will normally experience sadness, irritability, and even euphoria or rage occasionally. However, daily, persistent melancholic feelings for longer than 2 weeks or persistent manic feelings for more than 4 days endorse a nursing assessment of persistent affective instability.[7] To illustrate useful reasoning in the recognition of persistent mania and hypomania by nurses, the fieldworkers who administered the face-to-face questionnaires during the NCS-R study were trained to ask the following:

Some people have periods lasting several days or longer when they feel much more excited and full of energy than usual. Their minds go too fast. They talk a lot. They are very restless or unable to sit still and they sometimes do things that are unusual for them, such as driving too fast or spending too much money. Have you ever had a period like this lasting several days or longer? … Or have you ever had a period lasting several days or longer when most of the time you were so irritable that you started arguments, shouted at people, or hit people?[9]

Functional Impairment

The nurse can assess functional impairment by conceptualizing it as the ability to solve practical problems that may occur during activities of daily living.[4] An individual's functional ability infers the person's capacity to perform ADL's, whereas an individual's functional status refers to the person's actual performance of ADL's, which may not align with his or her total functional capacity.[4] Functional impairment is closely linked to disturbed vegetative functioning.

Disturbed Vegetative Functioning

Vegetative functioning refers to the individual's appetite, sleep, and energy level. Some clinicians may evaluate sexual energy or changes in sexual desire (libido) as a separate measure of vegetative functioning. During a melancholic period, the patient typically exhibits reduced energy level, increased sleep, decreased appetite, and decreased interest in sex. Atypically, individuals with melancholy may overeat, may become more sexual, or may be too agitated to sleep—this is known as mixed-state depression in the medical/psychiatric paradigm.[10]

Nurses may be confused to hear that the aforementioned increased appetite, hypersexuality, agitation, and insomnia present in the so-called mixed state depression diagnoses are also vegetative functioning characteristics in mania and/or hypomania. In fact, there is some debate in the medical/psychiatric paradigm regarding differentiation between mixed state depression diagnoses and the various bipolar diagnoses.[10] Although interesting, this debate is not very relevant in the nursing process, and nurses are advised to focus on assessing for the defining

characteristics of mood and affect while avoiding speculation about possible medical/psychiatric diagnoses.

Mental Status Assessment

The mental status assessment is well within the nursing scope of practice and important in analyzing the defining characteristics for the mood and affect concept. In the same way that a nurse should generally be aware of any patient's pulse rate and character, respiratory rate and character, blood pressure, temperature, and pain, the nurse should also know these elements of mental status assessment: general appearance, motor activity, mood, affect, speech, and alertness and orientation.[11]

The assessment and continuous monitoring of mental status enables the nurse to accurately assess cognitive status and functional status. The Confusion Assessment Method (CAM) is a scale the nurse can use to quantifiably measure mental status for particular situations, such as monitoring changes during or between shifts, or day to day.[12] However, although these instruments can be very useful, they are not replacements for the continuous monitoring and documentation of the patient's mental status that makes it a sixth vital sign.

A complete discussion of the mental status examination is beyond the scope of this concept presentation, but sources are readily available that provide details of this part of the assessment. It is helpful to remember that the assessment of information processing lies at the heart of the mental status assessment. That is, assessing the patient's ability to process information is the purpose of the mental status assessment. Collectively, the following information is used to form a clinical impression of the patient's total information processing ability and thereby form a basis for clinical management: the patient's appearance; motor functioning; speech and speech content; cognitive processes such as perception, judgment, insight, and memory; and alertness and orientation.

CORE COMPETENCIES

Mood and Affect

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to mood and affect.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential problems involving mood disorders.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to mood disorders for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to mood and affect,
- Demonstrate clinical judgment founded on broad knowledge of mood and affect.

CLINICAL MANAGEMENT

An effective and easily remembered way for nurses to translate data from the mental status assessment to clinical management is by analyzing it in the context of affect and the three main components of affect: mood, energy, and cognition. Fig. 30.2 illustrates these components and the normal cycling of euthymia into an unstable melancholy and then back into euthymia. Note that during the unstable period illustrated in Fig. 30.2, the individual displays a melancholic mood (green line) with reduced energy (red line) but increased cognition (blue line). Behaviorally, this individual would struggle with persistent sadness and low energy but agitated thoughts that disturbed his or her sleep. For individuals with affective instability, one or more of the three affective components will cycle out of euthymia in either direction, causing a variety of behavioral responses. By studying Fig. 30.2, one can picture different affective (behavioral) manifestations. What makes the assessment of disorders associated with affective instability so challenging is that each affective component may cycle at different rates and extremes. Different combinations of affective components will have quite different manifestations. Also, when components occur simultaneously at the extremes, the disabling effects are increased.

Primary Prevention

Primary prevention measures for mood spectrum disorders are not well established, and efforts toward prevention focus on societal egalitarian interventions such as reduction in poverty, racism, violence, and stress.[2] According to systematic reviews, programs that target prevention of mood disorders have been shown to reduce symptoms, but these programs tend to be early interventions rather than true prevention programs. Similar systematic reviews of universal prevention programs showed them to be ineffective.[4]

Secondary Prevention (Screening)

Secondary prevention or screening efforts are aimed at early detection of mood spectrum disorders with the hope of preventing serious consequences, and there is compelling evidence to support mood disorder screening.[2] The U.S. Preventive Services Task Force (USPSTF) recommends the routine screening of adults for mood disorders in primary care.[13] The USPSTF further recommends that healthcare providers "remain alert" for mood spectrum disorders in children and adolescents, and that systems should be established to handle the diagnosis, treatment, and follow-up care for individuals who do screen positive for mood spectrum disorders. Formulating and using the following types of questions might be as effective as longer screening measures: "Over the past 2 weeks, have you ever felt down, depressed, or hopeless?" and "Have you felt little interest or pleasure in doing things?"[1]

Screening instruments do not diagnose mood spectrum disorders; instead, they can be used to guide the diagnostic process, and articulate the intensity of associated symptoms.[13] By measuring the severity of symptoms associated with mood spectrum disorders, screening instruments assist clinicians to assess acuity and treatment effectiveness. There are numerous screening instruments validated for use at different times in the lifespan and appropriate for varying levels of cognition. Whichever screening instruments are used, it is important to realize that simple screening questions may indicate there may be a mood disorder.[14] For this reason, it is recommended that nurses do not completely rely on screening instruments but, rather, use

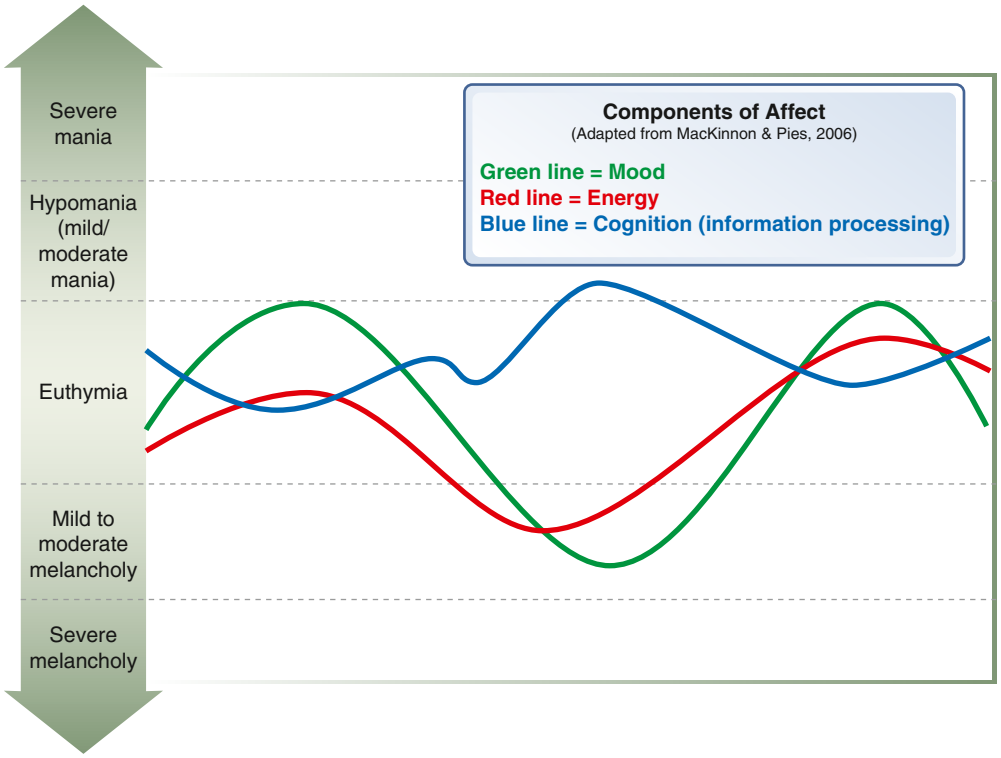

Fig. 30.2 Components of Affect. *Green line*, mood; *red line*, energy; *blue line*, cognition (information processing). (Adapted from MacKinnon, D. F., & Pies, R. (2006). Affective instability as rapid cycling: theoretical and clinical implications for borderline personality and bipolar spectrum disorders. *Bipolar Disorder, 8*(1), 1–14.)

their assessment skills to detect affective changes followed by an assessment of functional status and potential for violence when indicated. It is noteworthy that diminished functional status may appear vaguely as somatic symptoms and vegetative complaints such as fatigue, sleep disturbance, pain, altered interest in sexual activity, or other persistent vague complaints.[4]

Collaborative Care

The generalist practice nurse who is proficient in the assessment of affective instability plays a key role in detecting mood spectrum disorders and providing patients with opportunities for preventing deterioration in functional status. The most extreme outcome the nurse may prevent is death or disability by a suicide attempt. The evidence supports the idea that when mood spectrum deterioration is prevented in an individual, he or she stands a good chance of living a long, happy, and productive life.

This point is illustrated in an ex post facto review of interviews with individuals prevented from jumping off the Golden Gate Bridge between 1937 and 1978.[15] During that period, 625 people are known to have died of suicide there, and perhaps another 200 possible deaths may have occurred unseen at night or in bad weather. Dr. Seiden carefully followed the 515 "attempters" who were restrained from leaping off the bridge. Of those who were prevented from suicide by jumping off the bridge, there were higher rates of violent death, but approximately 90% of those prevented from suicide did not die later by violent death. Other data from this study interpreted by Dr. Seiden enabled him to form these conclusions:[15]

1. The chances are good that a person prevented from suicide will live a long and satisfying life. Ending one's life by suicide overlooks what might have happened—good feelings and good that could have been done.
2. Suicidal people should not be left to handle these emotions on their own. They should receive psychosocial help immediately, with at least 6 months of close support.
3. No matter how intense at the moment, the desire to die is temporary in almost all circumstances, negating the notion that "suicide is a choice."
4. Therapy, medication, relatives, friends, and groups all offer hope.

Individuals suffering from mood spectrum disorders are known to be slow in seeking treatment. Because the generalist nurse is quite likely to be the first clinician to detect the possibility of a mood spectrum disorder, it is imperative that the nurse is also able to discuss with the patient treatment options and reasonable expectations for treatment outcomes. In this way, the nurse may exert a substantial influence in convincing the patient to seek care. This influence is done most effectively with communication techniques called *motivational interviewing*.[16] Although additional training is helpful, motivational interviewing techniques lie within the generalist nurse scope of practice, and the effectiveness of motivational interviewing for mood spectrum disorders is well established.[16] Motivational interviewing was first developed to motivate individuals suffering from addictions to pursue change, and so it is further discussed in Concept 34 Substance Misuse and Addiction.

In addition to motivational interviewing, collaborative care for mood spectrum disorders consists of psychotherapy and/or pharmacotherapy and/or brain and vagus nerve stimulation therapies (e.g., electroconvulsive therapy, transcranial magnetic stimulation). Collaborative care also includes managing emergent situations (potential for suicide and/or other violence) among individuals suffering from affective instability. Each of these areas of interventions is discussed next. The nursing role in collaborative care may include case management activities when functional status impairment persists.

Psychotherapy Options

There are many different types of psychotherapy. There is strong evidence that psychotherapy is an effective treatment option that can facilitate change for people seeking mental health treatment. There is also evidence, including randomized controlled trials, that conclude long-term outcomes of pharmacotherapy versus psychotherapy are similar.[17] A combination of both pharmacotherapy and psychotherapy have shown the most effectiveness compared with pharmacotherapy or psychotherapy used alone.[17]

Because a person's thoughts and beliefs have been found to improve mood, cognitive behavior therapy works to shift negative automatic thoughts, and to challenge beliefs, in order to change feelings, and there by creating different behavioral outcomes.[18] In comparison, behavioral therapy is aimed at changing patterns of behavior that are repeated over time resulting in the same outcome. Interpersonal therapy focuses on communication patterns and the way the patient relates to others. Grief issue and postpartum depression have shown to respond well to interpersonal therapy, where the foundation of treatment addresses how to improve interpersonal relationships.[19] Family-focused therapy uses a wide of therapeutic processes aimed at problem solving and conflict management within the context of the family as a means of creating change.[20] A wide range of psychotherapy models have been shown to effective in addressing mood disorders in both children and adolescents.

Play therapy is an approach for children and adolescents in which a variety of toys and games are used to establish rapport so that the child may better express him- or herself. Toys and games may also be used for children who lack the cognitive and language abilities of expression.[21] Sand tray therapy is a variant of play therapy in which the individual places objects provided by the therapist but selected by the individual in a sand tray. The therapist then interprets the meaning of the objects and their placement to better understand the conflict present for the individual.[21] Other therapeutic modalities include light therapy, art therapy, and animal-assisted therapies, each with its own applications. Light therapy is used to treat seasonal affect disorder, a mood disorder that tends to occur during the winter months when there is less light. For some individuals, decreasing light is associated with melancholy. Animal therapies, such as equine therapy, can be used to process trauma. Art, dance, movement, and music can also be used in the treatment of a wide range of mental health and mood disorders.

BOX 30.1 Pharmacotherapy for Mood Spectrum Disorders

Antidepressants

- Selective serotonin reuptake inhibitors (SSRIs)
- Serotonin–norepinephrine reuptake inhibitors (SNRIs)
- Tricyclic antidepressants (TCAs)
- Norepinephrine–dopamine reuptake inhibiters (NDRIs)
- Monoamine oxidase inhibitors (MAOIs)

Mood Stabilizers

- Lithium
- Antiepileptic drugs (AEDs)
- Second-generation antipsychotic medications

Pharmacotherapy for Mood Spectrum Disorders

The main drug categories used in the treatment of mood spectrum disorders are antidepressants and mood stabilizers; antianxiety agents (anxiolytics) are also used (Box 30.1). In general, antidepressants are prescribed to treat patients diagnosed with depression and mood stabilizers are used to treat diagnoses associated with mania and hypomania such as the various bipolar diagnoses.[22] Subcategories of antidepressants include the selective serotonin reuptake inhibitors (SSRIs), the norepinephrine–dopamine reuptake inhibiters (NDRIs), the tricyclic antidepressants (TCAs), the serotonin–norepinephrine reuptake inhibitors (SNRIs), and the monoamine oxidase inhibitors (MAOIs). The mood stabilizers are either lithium or antiepileptic drugs (AEDs), and numerous second-generation antipsychotic medications also have been approved as mood stabilizers.[22]

Antidepressants. Many factors affect the choice of antidepressant medications, with remission or partial remission dependent on the particular neurochemical imbalance. Often the first-line choice for the treatment of depression is the SSRI category of antidepressants because positive response rates and the reduction of side effects. Essentially all psychotropic medications, are prescribed and management by primary care providers (PCP's). If depression is complicated by depression, the anxiety may dissipate once the antidepressant, such as the SSRI, becomes effective. The patient may notice a reduction in symptoms during the first 2 to 3 weeks but full effect can take at least 4 weeks, and sometimes as long as 6 to 8 weeks depending on medication dose adjustments. During this period, anxiety may temporarily be treated with an anxiolytic, but persistent agitation may be treated with an atypical second-generation antipsychotic agent or mood stabilizer. Individual responses to any pharmacotherapy are highly variable. To achieve a positive response, the dose might need to be increased after the initial 2 weeks based on the specific medication and the patient's tolerance to the medication; it is not unusual for medications to take 6 to 8 weeks to achieve a full response.[23]

The dual-action antidepressants known as SNRIs affect serotonin and norepinephrine levels, and these are also used in some cases of depression that has not responded to treatment as well, known as refractory depression.[23] SNRIs can also be effective in the treatment of patients who have anxiety disorders

or depression that is accompanied by anxiety symptoms. For many years, the TCA antidepressants were the standard choice in the treatment of depression, and they are still used occasionally; however, because of their multiple adverse effects, TCAs are rarely or never used as first-line choices.[23] Overdose of TCA medications can be lethal, so adherence and risk for suicide must be carefully evaluated before initiating medications from this category.

The MAOI antidepressants have also been demonstrated to be effective in the treatment of refractory depression, but they are typically not used as first-line treatment because of concerns about potentially fatal interactions (hypertensive crisis) between MAOI medications and foods containing tyramine. Tyramine occurs widely in foods, especially "spoiled" (fermented) or pickled foods. Foods to be avoided include many meats, chocolate, alcoholic beverages, cheese, tofu, beans, pineapples, plums, raspberries, figs, and nuts.[22]

It is not unusual for patients to experience some mild side effects when SSRI medications are initiated or when the dosage is increased.[23] These side effects should subside within a few weeks and include insomnia, abdominal discomfort, dry mouth, and mild headaches. However, there is some potential for any antidepressant medication, including the safer SSRI category, to produce a dangerous condition known as *serotonin toxicity* or *serotonin syndrome*.[22] Serotonin toxicity may occur abruptly, and initial presentation includes tachycardia, shivering, diaphoresis, dilated pupils, myoclonus (intermittent tremor or twitching), and hyperreflexia. Hyperthermia is common during serotonin toxicity, and temperatures may reach as dangerously high as 106°F (41°C). Serotonin toxicity is treated with serotonin blockade drugs such as chlorpromazine or cyproheptadine.

Patients should be instructed not to abruptly discontinue antidepressant medications because this may result in anticholinergic rebound symptoms known as SSRI withdrawal syndrome (also known as SSRI discontinuation syndrome). In SSRI withdrawal syndrome, the individual experiences flulike symptoms such as headache, diarrhea, nausea, vomiting, chills, dizziness, fatigue, insomnia, agitation, impaired concentration, and vivid dreams.[22] Symptoms last from 1 to 7 weeks and may be dangerous if there is an increased presence of suicidal ideation.

Mood stabilizers. For many years, lithium and AEDs have been the two main types of pharmacologic agents used as mood stabilizers. There are increasing numbers of second-generation antipsychotic drugs that have been approved and used for this purpose. The presumed action of lithium is through the regulation of the neurotransmitter glutamate. Kidney and thyroid function should be established before initiation of lithium therapy, and it is important to note that lithium has a very narrow therapeutic blood range of between 0.8 and 1.4 mEq/L. The toxic range begins at 1.5 mEq/L and may even overlap the therapeutic range, making dosage calculations difficult.[23]

Patients taking lithium should be taught to recognize early signs of lithium toxicity, including diarrhea, vomiting, drowsiness, muscular weakness, and lack of coordination. Severe symptoms include ataxia (failure or irregularity of muscle action), giddiness, tinnitus (ringing in the ears), blurred vision, and a large output of dilute urine. Long-term side effects include thirst, frequent urination, tremors, diarrhea, weight gain, and edema. The cause of weight gain is not definitely known, but it may be the result of an increased consumption of caloric beverages for thirst.[23] Patients taking lithium should be instructed to maintain a steady fluid and electrolyte balance through dietary sources because lithium is lost during perspiration, affecting its narrow therapeutic range. Lithium should not be taken by pregnant or breast-feeding women.[23] Antiepileptic medications such as carbamazepine, valproic acid/valproate, and lamotrigine are often used as mood stabilizers, but risk is substantial because AED overdose may be lethal.[23] Hepatic and renal functioning tests should be implemented prior to initiation of AED therapy and intermittently during treatment to detect and prevent long-term renal or hepatic damage.[23]

Brain Stimulation Therapy

The brain stimulation therapies are used primarily for treatment-resistant mood disorders that have failed to respond to other therapies.[24] During electroconvulsive therapy, the patient is sedated with a general anesthetic and a seizure lasting less than 1 minute is induced with electricity through electrodes placed at precise locations. It is not known exactly how brain stimulation works to relieve depression, but a general course of treatment is three sessions per week for 4 weeks. Common side effects include headaches, nausea, muscle aches, and occasional loss of memory. Magnetic pulses may be used instead of electricity in a brain stimulation therapy called repetitive transcranial magnetic stimulation.[24] Nursing management of patients who undergo brain stimulation therapies is identical to preoperative and postoperative nursing care of patients who are administered a general anesthetic. Nurses should perform teaching before the procedure so the patient will know what to expect. After the procedure, nurses should monitor the airway and mental status and assist the patient by orienting him or her to person, place, time, and situation as in any postoperative procedure.

Managing the Potential for Suicide and Violence

The generalist nurse who suspects the possibility of a mood spectrum disorder should first assess for emergency situations. It should be considered an emergency when patients are at risk for suicide or violence; these patients should not be left alone. Any patient who presents with decreased functional status and affective instability should be evaluated for suicidal ideation. If there is any doubt regarding the severity of affective instability, functional status, or suicidal ideation, the nurse should order continuous observation and refer the patient for an immediate, full evaluation. Fig. 30.3 demonstrates affective states associated with varying levels of suicide risk and potential for violence. In this figure, the individual reflects a persistently low mood, as depicted by the green line. On the left side of the figure, cognition and energy are declining, so despite the low mood, he or she will tend to lack the energy and cognitive ability necessary to plan and carry out a suicidal act.

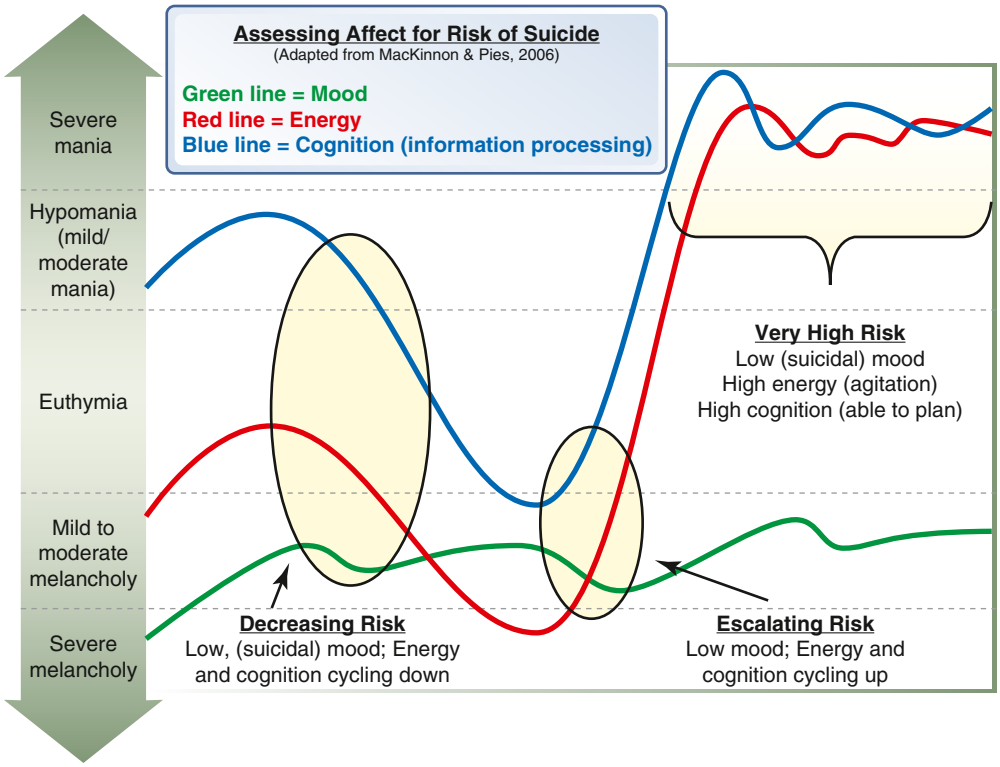
Assessing Affect for Risk of Suicide
(Adapted from MacKinnon & Pies, 2006)
Green line = Mood
Red line = Energy
Blue line = Cognition (information processing)
Severe mania
Hypomania (mild/ moderate mania)
Euthymia
Mild to moderate melancholy
Severe melancholy
Very High Risk
Low (suicidal) mood
High energy (agitation)
High cognition (able to plan)
Decreasing Risk
Low, (suicidal) mood; Energy and cognition cycling down
Escalating Risk
Low mood; Energy and cognition cycling up

Fig. 30.3 Assessing Affect for Risk of Suicide. *Green line*, mood; *red line*, energy; *blue line*, cognition (information processing). (Adapted from MacKinnon, D. F., & Pies, R. (2006). Affective instability as rapid cycling: theoretical and clinical implications for borderline personality and bipolar spectrum disorders. *Bipolar Disorder, 8*(1), 1–14.)

Comparatively, in the center of Fig. 30.3 the individual's energy and cognition begin to cycle upward, increasing the risk of suicide. This condition may sometimes occur on initiation of antidepressant medications. On the far right side of the figure, the mood is very low, whereas energy and cognition are very high. The individual has a low, suicidal mood with sufficient energy and cognitive ability to plan and execute a suicidal act or other acts of violence. This person is unlikely to perceive reality accurately, and if mood were elevated here, then the individual would be manic and out of control—at risk for dangerous and reckless behaviors such as gambling, violence, and promiscuity. Such individuals are likely to have hallucinations and/or delusions.

Minimum standards of practice by the generalist nurse for managing the potential for suicide and other violence are not well established. It is recommended that the minimum standard for the generalist nurse in any setting is to assess for violence potential, and when the potential for violence is endorsed, the patient should be assessed for acuity. This is done by asking the patient if he or she has been thinking about suicide or if he or she has any other thoughts of violence. The nurse should remember that talking about frightening thought content is known to provide relief for the patient.[25] It has been consistently demonstrated that talking about suicidal feelings does not increase the likelihood of acting on those feelings at any age.

The sudden appearance of unexplained euthymia in a person who has shown persistent affective instability may be an ominous sign of an impending suicidal act. In such cases, the appearance of euthymia results from the relief of making the decision to commit suicide. This decision may be accompanied by gift giving and acts of farewell. Not all suicides are predictable, especially impulsive suicide, but nurses who include assessment strategies discussed in this section will be more effective at recognizing possible mood spectrum disorders, initiating immediate interventions, and referring such patients to collaborative care. Other strategies include noting suicidal situations such as loss.[25] Loss may include the death of a loved one (including pets), separation, illness, employment status, and self-esteem. Behavioral signals may warn of suicidal ideation, including writing or creating art about death; giving away prized possessions; and joking about death, dying, suicide, or leaving.[25]

INTERRELATED CONCEPTS

A number of concepts in this textbook are connected to mood and affect in some way. Three concepts are specifically worth mentioning and are shown in Fig. 30.4. Like **Mood and Affect**, **Addiction** and **Cognition** share impairment in **Functional Ability** as a defining characteristic. That is, any individual experiencing affective instability, addictions, or confusion will also experience functional ability impairment. The affective disturbance may assume a variety of presentations, such as crying, rage, euphoria, or even flatness during loss of contact with reality, which is typical of confused states whether chronic or acute. Whatever the presentation, the standard of care should be to

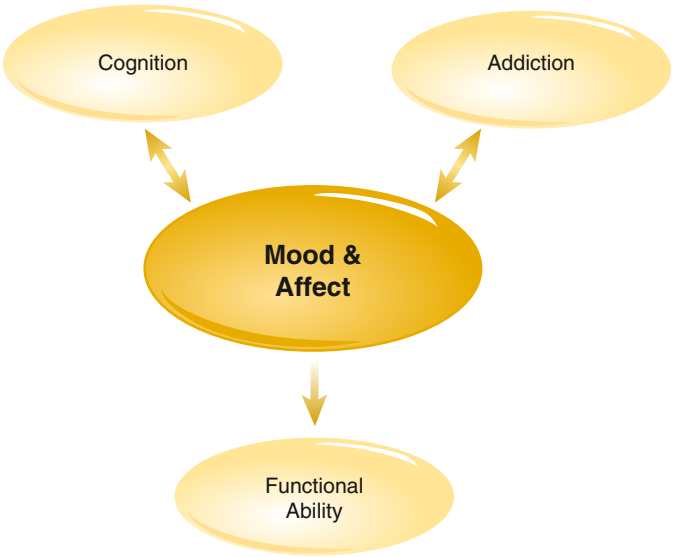

Fig. 30.4 Interrelated Concepts of Mood and Affect Include Addiction, Cognition, and Functional Ability.

BOX 30.2 EXEMPLARS OF MOOD AND AFFECT

Depressive Disorders

- Disruptive mood dysregulation disorder
- Major depressive disorder
- Persistent depressive disorder
- Postpartum depression
- Premenstrual dysphoric disorder
- Psychotic depression
- Situational depression
- Suicide

Manic Disorders

- Bipolar I
- Bipolar II
- Cyclothymia
- Suicide

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

assess for any deficit in functional status and from that assessment proceed to establish a nursing diagnosis based on the presence or absence of other defining characteristics. For example, functional ability may be impaired by addiction, or it can be caused by confusion; it can also be caused by a mood spectrum disorder. Only by a thorough assessment can the nurse differentiate underlying etiologies.

CLINICAL EXEMPLARS

There are a large number of medical psychiatric conditions with diagnostic criteria (medical defining characteristics) derived using the medical reasoning in the DSM-5. These medically defined, conditions provide useful exemplars for this concept. In medical psychiatry, these conditions are traditionally grouped dichotomously as disorders in either the depressive spectrum or the manic spectrum, but the unitary model of affect is more relevant to generalist nursing practice.[21] Exemplars are presented in Box 30.2.

Featured Exemplars

Major Depressive Disorder

As one of the most common mental health conditions, major depressive disorder is characterized by severe depressive mood symptoms that interfere with functional status, employment, and/or relationships that last for at least a 2-week period of time. This disorder can occur as a single episode, but, more likely, it occurs several times. This condition affects more than 6% of adults and 3% of adolescents in the United States each year. The average age of onset is 33 years; the populations at greatest risk are non-Hispanic whites and women.[7]

Persistent Depressive Disorder

Persistent depressive disorder (formerly known as dysthymic depressive disorder) differs from major depressive disorder in that the condition is chronic. Symptoms occur most of the day nearly every day for more than 2 years for adults or 1 year for children or adolescents. Symptom-free intervals last no longer than 2 months. Disqualifiers for use of this diagnosis include evidence of manic or hypomanic episodes during the first 2 years of symptoms, and the symptoms cannot be the result of direct use of substances (drugs and alcohol) or a medical condition.[7]

Disruptive Mood Dysregulation Disorder

Disruptive mood dysregulation disorder is applied to children and adolescents who have a persistent or angry mood most of the day nearly every day with intermittent recurrent severe temper outbursts or episodes of explosive rage. The intensity and duration of the outbursts are out of proportion to the situation and must occur in at least two settings (e.g., home and school). The time of diagnosis should occur between ages 6 and 18 years, and the onset of symptoms must appear before age 10 years; not more than 3 months can pass without symptoms.[7]

Bipolar I Disorder

Although the cause is not well understood, bipolar I disorder is thought to be caused by an imbalance of neurotransmitters and is characterized by extreme mood swings—both lowering of mood and exaggerated elevation of mood. There are several categories of this diagnosis, including manic, depressive, and mixed. Nearly 2.5 million adults in the United States have bipolar I disorder. The median age of onset is 18 years.

Bipolar II Disorder

Like bipolar I, bipolar II disorder is characterized by mood swings but is considered less severe. The main difference is a less exaggerated elevation of mood or "lesser mania" compared with bipolar I. This condition does not lead to life-threatening consequences, and psychosis does not occur. The median age of onset of bipolar II is 20 years, and there is a higher prevalence of bipolar II disorder among women.[7]

CASE STUDY

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Case Presentation

Daniela Diaz is a 30-year-old computer engineer whose mood is typically euthymic with an affect that is consistent with this mood. Her cognition, energy level, and mood are mostly consistent throughout the entire day. Recently Ms. Diaz has been experiencing challenges at work. Daniela's boss informed her that the quality of her work has been slipping, that she is behind on her current project, and that the quality of the project needs to improve. Because Daniela has a great deal at stake and feels at risk, she has been ruminating about the project. She has recently had problems sleeping, leading to fatigue and excessive tiredness during the day. She feels "down" and has a hard time concentrating at work. On the day of her final project presentation to management, she has a great deal of energy with her mind racing. She has a hard time calming herself and is noticeably anxious during the presentation. The following day, Daniela is given feedback from her boss and learns that the management team considered the project presentation very poor and she did not meet their expectations. She knows her upcoming performance evaluation will reflect this poor performance and is concerned about her job. Over the next month, her mood deteriorates and she experiences overwhelming sadness and lacks energy. She has periods of uncontrollable crying and makes statements that she is worthless. She continues to ruminate about her job; her continued worried thoughts contribute further to insomnia and she experiences agitation that fluctuates widely from lethargy to agitation.

Case Analysis Questions

1. In what way does this case represent exogenous factors in affective instability?
2. Refer to Fig. 30.2. How does Ms. Diaz's case reflect the components of affect as shown?

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CONCEPT 31

Anxiety

Launiece Newton and Sean P. Convoy

Anxiety is an adaptive response to stress that is ubiquitous across the life span. Anxiety is a subjective experience that can be measured objectively through physiologic and psychological dimensions. As an adaptive response, anxiety has served and continues to serve an evolutionary purpose. Early humans spent most of their time hunting, gathering, and maintaining shelter. Survival was predicated on the ability to address basic needs and simultaneously remain vigilant to potential threats. Upon exposure to a threat, humans relied on their evolutionary ability to rapidly translate sensory information into a cascade of internal biochemical responses that heightened awareness and generated the necessary energy to either fight or retreat. Although modern humans have fewer threats to contend with, their biochemical temperament has not appreciably changed. Simply stated, human prehistoric brains defined by "fight or flight" operating in present-day society can be conceptualized as anxiety.

Anxiety can be episodic or chronic, mild or severe, adaptive or functionally impairing, a symptom or a disorder. The nurse who understands the concept of anxiety is in a unique position to assess and meaningfully deliver care that has the potential to reduce illness, promote wellness, and instill self-efficacy.

DEFINITION

Several definitions of anxiety are found within the literature. While studying animals under stress, Cannon conceptualized the "fight-or-flight response" or the physiologic reaction that occurs in response to perceived threat.[1] This observation influenced many of the definitions of anxiety that followed. Peplau defined anxiety as a "response to a psychic threat" and codified it along a continuum that is discernable through the lenses of observation, focus, and learning ability.[2] Freud initially conceptualized anxiety as a "physiologic buildup of libidinal energy" but later redefined it as a "feeling of impeding danger that can be based on objective, neurotic, or moral threats."[3] Barlow and Cerney defined anxiety as a "diffuse state characterized by an unpleasant affective experience marked by a significant degree of apprehension about the potential appearance of future aversive or harmful events."[4] Beck proposed that anxiety is the product of "biased information processing of stimuli, which results in a systematic distortion of the person's thinking and construction of his or her experiences."[5] A psychobiologic definition of anxiety would invariably involve a complex interaction of neuroanatomic activation coupled with neurotransmitter activation and sensitivity that manifests above a clinical threshold as a constellation of symptoms. Each definition shares common themes involving both the perception of threat and a subsequent reaction. For the purpose of this concept presentation, anxiety is defined as a *subjectively distressful experience activated by the perception of threat, which has both a potential psychological and physiologic etiology and expression.*

SCOPE

Simply conceptualized, anxiety exists along a continuum (Fig. 31.1), comparable with Peplau's model, ranging from no anxiety to mild anxiety, moderate anxiety, severe anxiety, and panic.[2] This is considered a continuum because the level of anxiety any individual experiences at any given time fluctuates. It is widely accepted that in the mild to moderate form, anxiety can actually be beneficial because it promotes learning, motivation, and heightens awareness. In more severe or chronic forms, anxiety can be debilitating because it restricts cognitive capability and degrades functioning. In that regard, anxiety is analogous to rainfall because it is needed regularly to promote growth but not so often that one risks drowning. Table 31.1 presents typical findings associated with each of Peplau's four levels of anxiety.

NORMAL PHYSIOLOGIC PROCESS

Anxiety is the product of several complex physiologic and psychological processes best presented through the flight-or-flight response, the general adaptation syndrome, genotype, and neurophysiology.

Fight-or-Flight Response

During the fight-or-flight response, the sympathetic division of the autonomic nervous system interacts with the adrenal cortex to release adrenalin, which causes the heart to speed up and

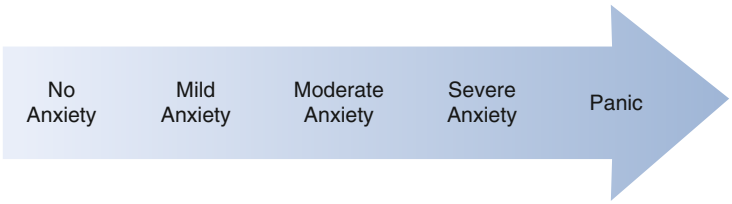

FIG. 31.1 Scope of Concept: Anxiety.

TABLE 31.1 Peplau's Four Levels of Anxiety

Mild Anxiety	Moderate Anxiety	Severe Anxiety	Panic Anxiety
• Sharp senses • Increased motivation • Heightened awareness • Enhanced learning • Optimal functioning	• Narrowed perceptional field • Less alert • Decreased concentration • Decreased problem solving • Muscular tension • Restlessness	• Concentration progressively narrowed • Severe impairment of attention • Severe cognitive impairment • Physical symptoms • Emotional symptoms	• Complete lack of focus • Tendency to misperceive environment • Marked change in baseline behavior • Marked functional impairment • Emotional and behavioral dysregulation

circulate blood faster, the lungs to dilate to increase the oxygen-carrying capacity of the blood, the liver to release stored glucose for a quick infusion of energy, the pupils to dilate for improved visual acuity, and the stomach to inhibit peristalsis as a means to conserve energy.[1] Secondary to these organ system changes, there are observable signs of the fight-or-flight response that include tachycardia, disambiguation, bladder relaxation, tremors, blushing, xerostomia, delayed digestion, and hyperacusis. If the experience is both infrequent and of short duration, the human body has the endogenous capacity to downregulate and return to homeostasis.

General Adaptation Syndrome

Building on Cannon's research, Hans Selye's general adaptation syndrome is relevant to the conceptual discussion of anxiety.[6] The *general adaptation syndrome* model establishes that an event (or *stressor*) that threatens an organism's well-being leads to a predictably staged process of bodily response:

- *Stage 1—Alarm:* Upon perceiving the stressor, the body reacts with an autonomic response that activates the sympathetic nervous system (see Fight-or-Flight Response), thus mobilizing the body's resources to respond to the perceived stressor.
- *Stage 2—Resistance:* The parasympathetic nervous system attenuates the reaction, returning many physiologic functions to homeostasis while other functions remain hyperactive, ensuring that the body remains alert and ready to respond.
- *Stage 3—Exhaustion:* If the nature of the stressor is sufficiently intense or of a protracted nature, it may exceed the body's capacity to compensate, thus exposing susceptibility to disease and death.

Genotype

A relevant variable to the discussion of anxiety includes genotype (or genetic makeup). As an individual blueprint for development, one's genotype drives the division of every cell that splits and diversifies within one's body. The development of vital neuroanatomy, neural circuits, and neurotransmitter systems within the brain is genotypically directed. Changes in genotypic expression set the stage for potential vulnerability to stress and anxiety. Although there is no one single gene complicit, the evidence suggests a number of possible gene variations (single nucleotide polymorphism, or SNP) may explain the range of vulnerability that is seen. Changes in genomic expression represent the antecedent element of vulnerability. Genotype cannot be underestimated because it contextualizes why some appear to be more or less vulnerable, or resilient, to stress than others.

Although there is no specific gene identified as a predictor of vulnerability to developing anxiety, genetic advances continue to move in the direction of precision medicine.[7] Through the use of genome-wide association studies (GWAS), researchers analyze genomes that are derived from a variety of participants. This scrutinization process is used to identify genetic markers (a specific DNA sequence on a chromosome) that may ultimately predict diseases, such as anxiety.[8] This type of genomic data would allow for precise disease prevention and treatment.

Brain Structure and Neurochemistry

Although the field of neuroscience is not yet so advanced as to declaratively implicate all brain structures, neural circuits, neurotransmitter systems, and gene variations associated with anxiety, it has made considerable progress. Critical structures within the limbic system, such as the thalamus, hypothalamus, cingulate gyrus, amygdala, hippocampus, and basal ganglia appear to play a central role in anxiety. Likewise, critical neurotransmitters and hormones such as serotonin, norepinephrine, γ-amino butyric acid (GABA), dopamine, and thyroid hormone are also central to anxiety.

The state of the science can theoretically trace certain symptoms of anxiety back to certain neural circuits and neurotransmitter systems. For example, the symptoms of fear, as seen during panic and phobia, are linked to a malfunction within the amygdala-centered neural circuit. This circuit integrates the amygdala, orbitofrontal cortex, and anterior cingulate cortex, along with a number of different neurotransmitters

systems (e.g., serotonin, norepinephrine, GABA, glutamate, and corticotropin-releasing factors).[9] Similarly, the symptom of worry can be traced back to a malfunction within a neural circuit incorporating the cortico-striatal-thalamo-cortical circuit involving various neurotransmitters (e.g., serotonin, GABA, dopamine, norepinephrine, and glutamate).[9]

Age-Related Differences

The evidence assessing age-related differences in anxiety is mixed. The symptom of worry appears to play a less prominent role in the presentation of anxiety, suggesting older adults experience anxiety differently than younger adults.[10] A reasonable argument can be made that, although anxiety occurs across the life span, critical windows of vulnerability for certain expressions of anxiety exist. Likewise, an argument can also be made to suggest that the perceptual experience of anxiety changes over the life span.

VARIATIONS AND CONTEXT

As shown in Fig. 31.2, the concept of anxiety can be symptomatically expressed a number of ways. A visual representation of anxiety based on symptom duration, symptom intensity, and functional impairment is shown in Fig. 31.3. Anxiety must be of a sufficient intensity, duration, and degree of functional impairment to be clinically recognizable. That point of observable recognition is defined as the *clinical threshold. Clinical perception* is defined as *the nurse's ability to recognize anxiety-based symptoms*. The novice or advanced beginner nurse may possess a sufficient understanding of anxiety to recognize overt symptoms such as a panic attack or obsessive-compulsive behavior. Through experience, the proficient nurse widens his or her clinical perception to recognize subtler symptoms of anxiety, such as irritability or changes in sleep patterns. The expert nurse understands the concept of anxiety and its symptomatic expression so well that

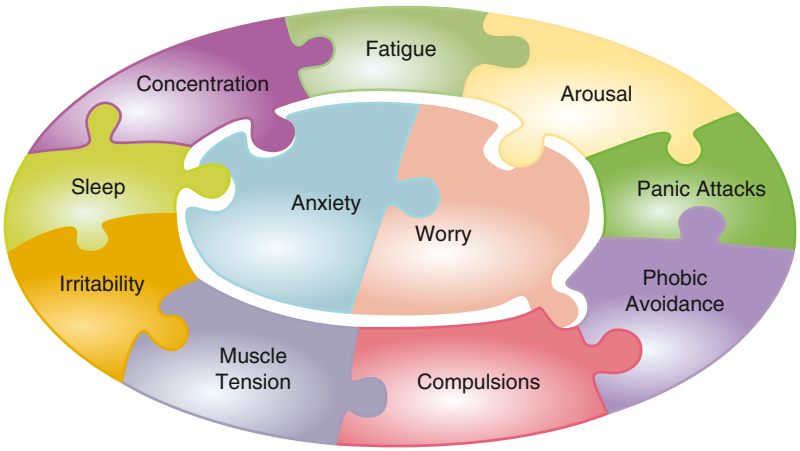

FIG. 31.2 Symptomatic Expressions of Anxiety. (Redrawn from Stahl, S. M. [2013]. *Stahl's essential psychopharmacology* [4th ed.]. Cambridge, UK: Cambridge University Press.)

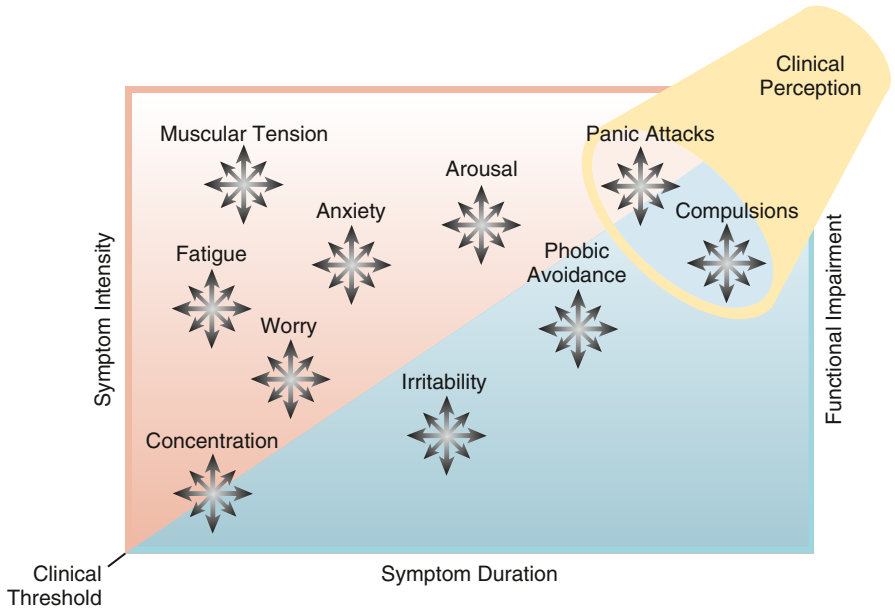

FIG. 31.3 Anxiety Symptoms Based on Intensity and Duration.

he or she is sometimes able to perceive anxiety below the clinical threshold.

The clinical opportunity for the nurse lies in the ability to understand anxiety and all of its symptomatic expressions, overt and subtle. Being able to recognize the earlier, subtler symptoms can create new opportunities that exist below the clinical threshold. Such opportunities can dramatically influence the trajectory of care, health, and wellness.

CONSEQUENCES

If the physiologic consequences of anxiety are dependent on symptom duration, symptom intensity, and degree of functional impairment, one can reasonably conclude that the physiologic consequences of anxiety are variable. The general adaptation syndrome establishes that certain stressors are powerful enough to result in exhaustion and subsequent physiologic consequences. The physiologic realization of alarm, resistance, and exhaustion is varied. This variation is influenced by endogenous (or genotype), exogenous (or environment), and the dynamic interaction between endogenous and exogenous (or epigenetic) sources.

Physiologic consequences of anxiety link back to the deleterious effect of chronic sympathetic activation on renal, cardiovascular, endocrine, gastrointestinal, immune, neurologic, and psychiatric systems. Recent research has provided additional evidence associating anxiety disorders with future projected risk for medical morbidity, specifically asthma, obesity, hypertension, diabetes, heart disease, and pain disorders.[11]

Psychological consequences of anxiety can include impaired cognitive development, comorbid depression, and subsequent substance use disorders.[12] In severe or chronic cases, these complications can be disabling. As a consequence of comorbid depression, anxiety can ultimately lead to increased mortality.[12]

Advances in psychoneuroimmunology (or the study of interactions between psychological, neurologic, and immune systems) have established that the mind and body have equal potential to both influence and be influenced by the other. The symptomatic manifestations and potential consequences of anxiety are both psychological and physiologic in nature.

RISK FACTORS

Research associated with risk factor determinations for anxiety has largely been performed in relation to clinical diagnosis. Many anxiety disorders appear to also be influenced by different environmental, temperament, and genetic variables.[13]

Populations at Risk

As noted in the World Health Survey, the lifetime prevalence for anxiety disorders is estimated to be about 31% in the United States.[12] The 12-month prevalence rate for childhood and adolescents is similar to adults with 11 years as the average age of onset.[12] Demographically, females have nearly twice the risk of developing anxiety compared with males. However, sex prevalence tends not to play a role in childhood, but progresses through adolescence.[12] European Americans appear to be more vulnerable to anxiety compared with their African American or Hispanic counterparts. Age prevalence appears to peek in middle adulthood around age 30.[14]

Individual Risk Factors

Individual risk factors for anxiety exist within four potentially interrelated domains of temperament, environmental, genetic, and physiologic. Although the desire to weigh risk factors linearly might be enticing, our evolving understanding of the science suggests the relationship among these variables is anything but direct. The experienced nurse dynamically considers all four domains.

Temperament

Temperament refers to early developmental variations in emotional regulation, attention, and motor response as a result of an individual's environment.[15] These developmental responses are ultimately responsible for shaping one's personality. The general characteristics involved in one's temperament include persistence, reactivity, and sociability.[15] Persistence refers to a capability to accomplish goals despite challenges. Reactivity represents the emotional response to adverse situations. Sociability refers to one's ability to engage in and adjust to new situations. Strong correlation exists between temperaments involving behavioral inhibition, inactive physical or verbal response during unfamiliar situations, and the development of anxiety disorders.[16]

Research identifies nine different temperamental traits of children (i.e., activity level, distractibility, intensity, regularity, sensory threshold, approach/withdrawal, adaptability, persistence, and mood). Temperament is a potential risk factor for anxiety with selective mutism, specific phobia, social anxiety disorder, panic disorder, agoraphobia, and generalized anxiety disorder (GAD).[13]

Environmental

Environmental factors are linked to certain clinical manifestations of anxiety. For example, separation anxiety disorder centers on a stress event defined by loss, death, or profound change. Parental social inhibition may serve as a role model for selective mutism among children. Several environmental factors appear to influence the development of phobias, including parental overprotectiveness, parental loss or separation, and physical or sexual abuse, as seen in agoraphobia (a fear of leaving one's home or being in crowded places).[13] Childhood maltreatment and adversity during childhood appear to be risk factors for social anxiety disorder. Physical and sexual abuse appear to be more common among those with panic disorder than other anxiety disorders.

Other environmental risk factors include those in the natural environment that may threaten human life, such as air pollution, radiation, climate change, and communicable diseases.[17] The COVID-19 or severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) pandemic is an example of a global environmental risk factor for anxiety. As a result of this pandemic, unemployment, financial hardship, isolation, and health-related professional responsibilities contributed to increased rates of anxiety.[17]

Genetics

Heritable evidence associated with anxiety continues to evolve and is thought to account for about 35% of GADs and about 50% of agoraphobia, panic disorders, and social anxiety disorders.[16] Family and twin studies have shown that first-degree relatives of a study participant with an anxiety disorder are about four to six times more at risk of developing an anxiety disorder than that of participants without a related disorder.[18] Twin studies have concluded that hereditability is estimated to be 30% to 50% and that genetic overlap is present in panic disorder, GADs, phobias, obsessive compulsive disorder, and posttraumatic stress disorder (PTSD).[18]

Due to recent genetic study approaches, such as Candidate gene and Genome Wide Association studies (GWAS), the psychiatric community has been able to associate gene variations to an increased risk for anxiety and stress-related disorder.[18] Candidate gene studies focus on a small set of predetermined genes that correlate with specific disorders. Conversely, the GWAS surveys the entire genome (the complete set of genes present in the cell of an organism) for genetic variations that may increase the vulnerability to disorders, as studied in such disorders as PTSD and panic disorder.[18]

Though no specific genetic markers have been identified as a determinant of risk for a precise anxiety disorder, genetic studies are continuing to progress in this direction. It is imperative that nurses, both novice and experienced, be sensitized to evolving scientific methodologies that will guide future diagnostics and therapeutics.

Physiologic

Researchers have identified a limited number of physiologic variables that can also serve as risk factors for anxiety. Carbon dioxide (CO_2) hypersensitivity has been associated with increased risk of panic disorder, social anxiety, GAD, and PTSD.[19] There is some evidence that link blood injection injury with phobias. This connection is hypothesized to be related to autonomic dysregulation caused by vagal excitation, which causes slowed heart rate and low blood pressure, and sympathetic withdrawal (vasovagal syncope).[20] In addition, a number of medical conditions have the potential to independently promote anxiety and anxiety-based symptoms (Box 31.1).

BOX 31.1 Health Conditions Commonly Associated with Anxiety

- Cancer
- Chronic obstructive pulmonary disease
- Asthma
- Heart disease
- Diabetes
- Drug or alcohol withdrawal
- Thyroid disease (hyperthyroidism or hypothyroidism)
- Pheochromocytoma
- Chronic infections
- Vestibular dysfunction
- Irritable bowel syndrome

ASSESSMENT

Individuals with time-limited, mild to moderate anxiety may appear asymptomatic or merely distracted during a nursing assessment. The proficient or expert nurse may be able to perceive more subtle signs of anxiety, such as impaired concentration, distractibility, and talkativeness, whereas the novice or advanced beginner may only recognize the more overt signs of anxiety, such as panic or compulsive behavior. Regardless of proficiency level, assessment for anxiety requires the collection of a history, physical assessment, and mental status examination (MSE) (Box 31.2).

History

Prior to collecting a history, meaningful effort must be put into establishing a therapeutic rapport. Asking a list of rote questions involving extraordinarily sensitive medical history without building rapport is at best ill-advised and at worst unprofessional. The goal of the history is to obtain vital and time-sensitive health information that has the potential to immediately and significantly influence the trajectory of care.

When conducting the history, be advised that not every individual understands or even acknowledges terms such as "anxiety" or "panic." Although some individuals may have experienced clinically significant and functionally impairing anxiety-based symptoms for years, they will not necessarily understand or convey the symptom experience the way the nurse does. Consequently, the nurse is advised to avoid using psychological terminology when communicating with patients. As opposed to asking, "Do you experience anxiety?" the nurse can alternatively ask, "Do you find yourself worrying a lot and feel unable to control it?" Instead of asking, "Do you ruminate?" the nurse can alternatively ask, "Do you find it hard to shut off your mind from overthinking?" A good exercise prior to assessing a patient for anxiety is to review the symptomatic expressions of anxiety (see Fig. 31.2) and develop more user-friendly, nonclinical terms for the identified symptoms. Somatic symptoms often require a systematic measure of assessment to improve reliability. For this reason,

BOX 31.2 Nursing Assessment of Anxiety

Medical History
- Risk factor identification
- Mental health history
- Substance use history
- Current medical problems
- Familial medical history
- Trauma exposure

Physical Examination
- Vital signs
- Auscultation of heart and lungs
- Palpation of thyroid
- Cranial nerve assessment
- Blood and urine studies

Mental Status Examination
- Appearance
- Attitude
- Behavior
- Mood and affect
- Speech
- Thought process
- Thought content
- Perceptions
- Cognition
- Insight
- Judgment

using scaled questions such as "On a scale of 1 to 10, with 1 being no distress and 10 being severe distress, how is your worry today?" becomes a way to operationalize subjective data in a meaningful way.

Physical Assessment

Understanding human physiology, the competent nurse can reasonably anticipate many of the physical manifestations of anxiety. Autonomic activation can manifest in hypertension, tachycardia, tachypnea, diaphoresis, ataxia, tremulousness, gastrointestinal distress, and muscular tension. Although many of these physical findings are sensitive to anxiety, they are by no means specific to anxiety. Making a determination of anxiety should never be done until other high-risk medical explanations (e.g., myocardial infarction, embolism, and stroke) have been ruled out. Serial evaluation of physical symptoms is vital to determine both functioning and response to treatment.

A well-executed mental status examination (MSE) is another objective data point that can meaningfully quantify anxiety. As established in Box 31.2, the MSE systematically evaluates a number of variables (e.g., distractibility, psychomotor agitation, tremulousness, rapid rate of speech, confusion, perseverated thought, and impaired short-term memory) that are potentially sensitive to anxiety.

Diagnostic Tests and Screening Measures

There is no specific test or study that can definitively rule anxiety in or out. However, there are a number of studies worth discussing. Laboratory studies (complete blood count, comprehensive metabolic profile, arterial blood gas, thyroid function test, spinal fluid analysis, urinalysis, and urine drug screen), radiologic studies (computerized tomography), or procedural studies (electrocardiogram, stress test, or electroencephalogram) often provide vital findings that contextualize suspected anxiety-based symptoms. Sometimes the only way to rule on anxiety is to first rule out all other medical explanations.

Evidence-based screening tools are also available to assess for anxiety across the life span. The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has implemented a cross-cutting symptoms measure, for both children and adults, that also has a general value as a crude psychiatric assessment.[13] For children and adolescents, well-established common screening tools include:

- The Beck Anxiety Inventory for Youth (BYI),[21]
- Spence Children's Anxiety Scale (SCAS),[22]
- Revised Children's Manifest Anxiety Scale (RCMAS-2),[22] and
- Screen for Child Anxiety Related Emotional Disorders (SCARED).[23]

For adults, the well-researched tools include:

- The Hamilton Anxiety Scale,[24]
- Beck Anxiety Inventory (BAI),[25]
- Generalized Anxiety Disorder–7 Item (GAD-7),[26] and
- Posttraumatic Stress Disorder Checklist (PCL-5).[27]

CORE COMPETENCIES

Anxiety

- Incorporate evidence-based knowledge pertaining to nursing and other sciences into practice, as they relate to anxiety.
- Conduct a clinically relevant assessment to identify actual or potential health-related complications associated with anxiety.
- Collaborate with an interdisciplinary team to develop collective healthcare goals related to anxiety considering the targeted population.
- Develop a patient-centered treatment plan that promotes health maintenance, disorder prevention, and disorder management as it relates to anxiety.
- Use evidence-based data to educate individuals and communities on pharmacologic and nonpharmacologic therapeutic approaches for anxiety-related disorders.

CLINICAL MANAGEMENT

Primary Prevention

Primary prevention seeks to deter injury or illness via risk reduction. This is done by education, altering risk behaviors, decreasing exposure, and enhancing resistance to those agents that promote anxiety. Our developing understanding of neuroscience suggests that the psychobiologic damage of mental illness commonly precedes symptomatic expression. Consequently, prevention measures are vital.

Primary prevention targeting anxiety theoretically begins during pregnancy by promoting the health, wellness, and functioning of the pregnant mother and associated family support system. Mental health–focused well visits across the life span conducted by informed healthcare professionals are integral to risk recognition. Thus, a thorough family history that quantifies mental illness is critical. Resources and investment into strengthening family functioning and stability can serve as a protective measure against anxiety.

Secondary Prevention

Secondary prevention involves screening for the early detection of an illness. The United States Preventative Services Task Force (USPSTF) recommends screening for anxiety in children over the age of 8 through age 18.[28] Furthermore, the USPSTF recommends screening for anxiety disorders in all adults (including those who are pregnant and postpartum) up to age 65.[29] There is insufficient evidence to recommend anxiety screening in children under age 8 and adults 65 years or older.[28,29] Maintaining an awareness of and monitoring for symptoms and functional impairment allows for early identification and treatment.

Collaborative Management

The collaborative approach for the management of anxiety incorporates tertiary prevention, which aims to optimize treatments and prevent relapse among those with chronic anxiety. Anxiety is commonly recognized as one of the most treatable psychiatric conditions. Because psychiatric illness is etiologically multifactorial and requires multimodal responses, it is uncommon that one treatment approach alone effectively and definitively treat anxiety. More often, a combination of therapies is associated with the best results. It is also important to distinguish between

treatment and symptom management. Psychotropic interventions have great potential to manage symptoms, and psychotherapeutic interventions alongside psychotropic interventions have the greatest potential to treat the disorder.

Pharmacotherapy

Dating back to the mid-1950s, antianxiety agents such as meprobamate, otherwise known as "mother's little helper," quickly found a lucrative market in American society, with an estimated 36 million prescriptions filled in the first decade of its existence. In the 1960s, benzodiazepines (BZDs) became the prescribed drug of choice for anxiety. Although BZDs continue to dominate the pharmaceutical market, a number of other agents have expanded treatment options during the past few decades.

β-Adrenergic receptor antagonists. Considering Fig. 31.3, some individuals only episodically or situationally experience anxiety above the clinical threshold, such as in social anxiety. In those instances, there may be an indication for a psychotropic agent that can be used as needed. β-Adrenergic antagonists or β-blockers (e.g., propranolol, nadolol, and atenolol) have been used to treat varied expressions of anxiety (e.g., performance anxiety, phobias, psychosis-related aggression, panic disorders, and extrapyramidal side effects of antipsychotic medications).[30] β-Blockers work by binding the β-adrenergic receptor and subsequently blocking the effects of epinephrine and norepinephrine, consequently (and temporarily) blocking the physiologic manifestations of anxiety. Although β-blockers are generally well tolerated, they can result in postural hypotension, dizziness, bradycardia, depression, syncope, fatigue, and depession.[30] Some of these agents are contraindicated in individuals with asthma, persistent hypotension, and congestive heart failure.[30]

Benzodiazepines. BZDs are a commonly used antianxiety agent prescribed on a scheduled and as-needed basis. BZDs (e.g., lorazepam, alprazolam, clonazepam, and diazepam) enhance the effect of the neurotransmitter GABA, which is known to inhibit or calm nerve activity, and are exceptionally effective for the short-term management of anxiety symptoms. Unfortunately, BZDs are also highly addictive agents that pose serious risk for complicated, potentially life-threatening withdrawal. They also pose risk for central nervous system sedation and rebound anxiety. A systematic review and meta-analysis showed that BZDs increase the risk of dementia by 16%.[31] For these reasons, long-term BZD use is ill-advised.

Nonbenzodiazepine antianxiety agents. Buspirone is a serotonin$_{1A}$ partial agonist that diminishes serotonin activity postsynaptically, consequently delivering anxiolytic actions with less central nervous system sedation. Hydroxyzine is an antihistaminergic agent that blocks histamine$_1$ receptors, consequently prompting sedation. Each agent may be able to provide some degree of symptomatic relief of anxiety but will likely be of less utility if the patient has already been sensitized to the effects of a BZD. Gabapentin and pregabalin are anticonvulsant agent that are usually prescribed for partial seizures, neuropathic pain, postherpetic pain, and fibromyalgia.[32] They work by binding to the alpha-2-delta subunit of calcium channels to inhibit neurotransmitter release, which reduces excitation seen in anxiety.[32] These agents may be used when other anxiolytics are not tolerated or contraindicated.

Antidepressant agents. Although antidepressant agents have historically been used to treat symptoms of depression, a commonality between depression and anxiety is serotonin and norepinephrine (or monoamine) dysregulation. Consequently, there are currently a number of antidepressants on the market that hold a U.S. Food and Drug Administration (FDA) indication for the treatment of anxiety:

- *Tricyclic antidepressants (TCAs):* TCAs influence a number of different neurotransmitter receptors potentially relevant to anxiety. Doxepin is the only drug in this group that has an FDA indication for the treatment of anxiety. Although effective, this is considered third- and fourth-tier treatment choice due to its significant side effects, potential for suicidal thinking, and lethality if used as an overdose agent.
- *Monoamine oxidase inhibitors (MAOIs):* MAOIs (e.g., isocarboxazid, phenelzine sulfate, tranylcypromine sulfate, and selegiline) inhibit the activity of monoamine oxidase enzymes, obstructing the breakdown of monoamine neurotransmitters and hence increasing monoamine availability. Phenelzine sulfate is effective in treating symptoms associated with social anxiety and panic disorder,[33] but it is considered a second- or third-tier choice compared with the newer agents that boast fewer side effects.
- *Selective serotonin reuptake inhibitors (SSRIs):* SSRIs inhibit the reuptake of the neurotransmitter serotonin presynaptically, thus increasing the availability of serotonin postsynaptically. SSRIs specifically indicated for anxiety disorders include fluoxetine, paroxetine, sertraline, and escitalopram. SSRIs are generally well-tolerated agents but demonstrate an increased risk for a life-threatening condition (serotonin syndrome) when combined with other agents that agonize serotonin. Abrupt discontinuation of SSRIs can lead to discontinuation syndrome.
- *Serotonin-norepinephrine reuptake inhibitors (SNRIs):* Like their SSRI counterparts, SNRIs block the presynaptic reuptake of both serotonin and norepinephrine, thus increasing the availability of both neurotransmitters postsynaptically. Two SNRI agents are indicated for anxiety: venlafaxine (for panic disorder, social anxiety disorder, and GAD) and duloxetine (for GAD). Like SSRIs, abrupt discontinuation of SNRIs can lead to discontinuation syndrome.

Psychotherapy

A number of different psychotherapeutic modalities have demonstrated efficacy in treating clinically significant anxiety.

Psychoeducation. Psychoeducation is a modality of care that provides patients and their support systems with basic instruction on a wide array of topics, including diagnosis, treatment, risk management, health promotion, illness prevention, and anticipatory guidance. Although not as stimulating as other forms of therapy, psychoeducation is a foundational resource that is vital to all treatment, especially anxiety.

Cognitive-behavioral therapy. Of all the recognized psychotherapies, cognitive-behavioral therapy (CBT) has the largest evidentiary base supporting its utility for the treatment

of anxiety. CBT is based on the notion that how one perceives and processes sensory stimuli has a direct bearing on the reaction one has to that situation. CBT uses a systematic process of Socratic questioning to expose cognitive distortions and core beliefs. Once identified, the therapist and patient collaborate in a process of initially recognizing and neutralizing and later modifying those cognitive distortions and core beliefs. The result of this process is the alleviation of anxiety.

Prolonged exposure therapy. Prolonged exposure (PE) is a specialized form of psychotherapy that targets anxiety born of trauma by systematically exposing patients to their own trauma via a structured process of education, breathing, retraining, and real-world (or in vivo) and imaginal exposure. Conceptually, the goal of PE is to take patients back to their index trauma and systematically expose them to those sensory aspects of the trauma, thereby changing the subsequent reaction to the sensory trigger.

Cognitive processing therapy. Cognitive processing therapy (CPT) is a manualized form of cognitive therapy used to treat trauma-related anxiety, as seen in PTSD.[34] Three components of CPT include: (1) provides psychoeducation about trauma symptoms and its etiology, (2) heightens awareness of one's own thoughts and feeling associated with the trauma, and (3) teaches skills for managing distressing thoughts and feelings about the trauma. Ultimately, the goal of CPT is to help patients understand how beliefs associated with safety, trust, control, self-esteem, other people, and relationships have changed.

Mindfulness-based cognitive therapy. Traditional CBT teaches the patient to challenge his or her own cognitive distortions, whereas mindfulness-based cognitive behavioral therapy (MBCT) teaches the patient to reconceptualize cognitive distortions as a transient experience that is a predictable part of the human experience. MBCT has established efficacy with numerous anxiety disorders, such as GAD.[35,36] The goal of MBCT is to teach the patient how to develop the skill of nonjudgmental awareness of his or her own thoughts and feelings because doing so delimits the symptomatic experience of anxiety that commonly follows.

Eye movement desensitization and reprocessing. Eye movement desensitization and reprocessing (EMDR) psychotherapy is a nontraditional manualized form of psychotherapy that aspires to process traumatic memories while simultaneously focusing on other sensory stimuli (e.g., sounds, hand taps, and/or eye movements). EMDR reduces anxiety symptoms by 70% and is shown to be effective in treating PTSD, anxiety, panic disorder, and phobia.[37]

Other Therapies

A number of other therapies (e.g., animal-assisted therapy, lifestyle modification, and complementary and alternative medicine) have shown evidence of benefit for a number of anxiety-based conditions. Animal-assisted therapy is building an evidentiary base as a complimentary treatment for trauma and stress.[38] Likewise, a number of complementary and alternative medicine methods (e.g., herbal remedies, acupuncture, and mind-body modalities) appear to demonstrate benefit in the treatment of anxiety-based disorders.[39] Although there are a number of supplements (e.g., kava kava, valerian root, and St. John's wort) on the market that boast efficacy in treating anxiety, these agents are not subject to the rigorous scrutiny of a governing body such as the FDA to ensure quality control. Consequently, there are demonstrated risks associated with combining supplements with psychotropic medications.

INTERRELATED CONCEPTS

There are several interrelated concepts that potentially demonstrate a linkage with anxiety (Fig. 31.4), including Person-Centered Care, Stress and Coping, Mood and Affect, and Interpersonal Violence. The most important component of clinical management is the incorporation of **Person-Centered Care,** which focuses on the needs, wishes, and priorities of the patient when developing a treatment plan to manage anxiety. Person-centered care is accomplished through building a therapeutic relationship and developing concordance between the patient's perspective on quality of life and best health outcomes. **Stress and Coping** is an interrelated concept because individuals with clinically significant anxiety are by definition in stress overload. It logically follows that if stress can exacerbate anxiety, so too can anxiety make one more vulnerable to stress. Coping is the

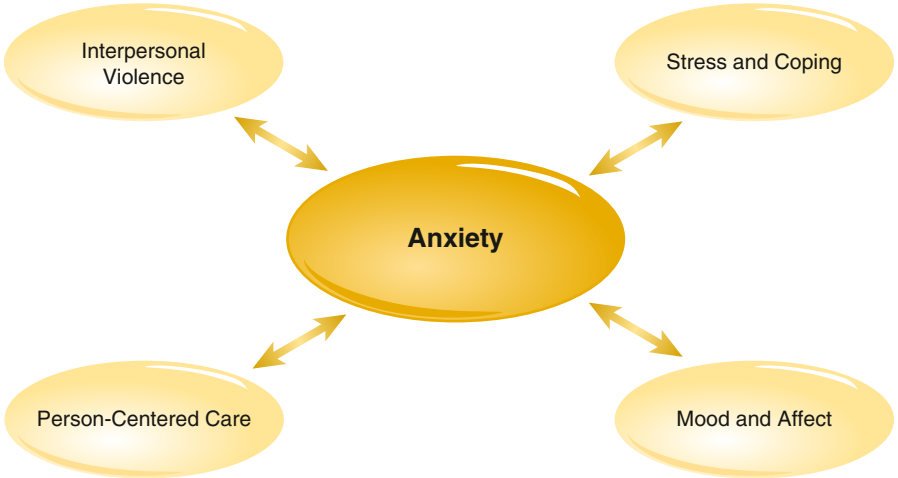

FIG. 31.4 Anxiety and Interrelated Concepts.

response to stress and is linked to anxiety particularly if coping skills are ineffective to resolve the stress. **Mood and Affect** comprise the subjective (mood) and objective (affect) manifestation of stress, coping, and anxiety. Lastly, **Interpersonal Violence** is defined as *a set of overt behaviors that have the potential to place both the patient and others at risk*. Therein, we can establish interpersonal violence as one of many potential expressions of stress, coping, and anxiety.

CLINICAL EXEMPLARS

There are a number of exemplars of anxiety that represent established medical diagnoses (Box 31.3). It is beyond the scope of this text to provide detailed information on each of these exemplars, but a brief explanation of some of the most common exemplars is presented in the section that follows. For detailed information and nursing care for each of these exemplars, consult a psychiatric-mental health nursing textbook.

BOX 31.3 EXEMPLARS OF ANXIETY

Depressive Disorders
- Major depressive disorder with anxious distress

Anxiety Disorders
- Separation anxiety disorder
- Selective mutism
- Specific phobia
- Social anxiety disorder
- Panic disorder
- Agoraphobia
- Generalized anxiety disorder
- Substance/medication-induced anxiety disorder
- Anxiety disorder due to another medical condition
- Unspecified anxiety disorder

Obsessive-Compulsive and Related Disorders
- Obsessive-compulsive disorder
- Body dysmorphic disorder
- Hoarding disorder
- Trichotillomania
- Excoriation disorder
- Substance/medication-induced obsessive-compulsive and related disorder
- Obsessive-compulsive and related disorder due to another medical condition
- Unspecified obsessive-compulsive and related disorder

Trauma and Stressor-Related Disorders
- Reactive attachment disorder
- Disinhibited social engagement disorder
- Posttraumatic stress disorder
- Acute stress disorder
- Adjustment disorder with anxiety
- Unspecified trauma- and stressor-related disorder

Substance Use Disorders
- Substance-induced anxiety disorder

Personality Disorders (Cluster C)
- Avoidant personality disorder
- Dependent personality disorder
- Obsessive-compulsive personality disorder

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Featured Exemplars

Simple Phobia

A simple phobia is characterized as an intense fearful reaction to an object or situation. The reaction is disproportionate and excessive and goes against rational thinking. Examples of common simple phobia "triggers" include fear of insects, heights, water, or closed spaces. When exposed to the object or situation, the individual typically has a paniclike experience and a subsequent strong urge to avoid or eliminate the situation. Some individuals develop simple phobias as a result of a physical or psychological traumatic exposure, such as being bitten by a dog prompting cynophobia or being trapped in a closed space prompting cleithrophobia.

Social Phobia

Social phobia refers to a type of anxiety characterized by extreme fear of situations involving social interactions in public settings. Examples include attending social events, eating in public, speaking in public, and using public bathrooms. An individual with social phobia often seeks ways to avoid social situations. When faced with an event, the individual will often experience anxiety nearing panic leading up to, during, and following a social situation.

Panic Disorder

A panic disorder occurs when an individual experiences a constellation of anxiety-based symptoms that approximate panic. Panic triggers include a fear of an impending disaster or fear of losing control in the absence of an actual threat. These recurrent panic events can interfere with one's life to the point that they become disabling. Common physical symptoms include a racing or pounding heart, chest pain, difficulty breathing, sweating, weakness, and dizziness. Panic disorders affect approximately 6 million Americans, occur twice as often in females as in males, and most often develop in adolescents or adults.

Generalized Anxiety Disorder

A GAD is described as generalized worry (and often an inability to control worry) accompanied by uncomfortable symptoms of anxiety that can near the level of panic. The nature of the worry typically involves varied aspects of the individual's life and would be considered disproportionate or excessive by other people's standards. Examples include worries related to completing tasks on time, worrying about performance, and worrying about family members.

Obsessive-Compulsive Disorder

Obsessive-compulsive disorder (OCD) is a psychological state characterized by obsessive thoughts that manifest as compulsive behavior. Common examples include a need to repeatedly wash hands, check things, repeat an action, count things, a preoccupation with symmetry, and hoarding. The inability to fulfill the ritual is commonly associated with profound anxiety. An individual with OCD spends excessive time engaged in repetitious thoughts or behaviors, which interfere with the individual's daily life.

CASE STUDY

Case Presentation

Nicole is a 42-year-old female who is employed as a police officer. She has never been diagnosed with a mental health disorder. Her mother and father divorced when she was 15 years old. She was raised by a single mother along with her older brother and younger sister. She has worked in law enforcement for 12 years. During this time, she witnessed an officer-involved shooting, worked several homicide cases, lost a fellow partner to work-related injuries, and worked on the front lines during the COVID-19 pandemic (this event represents the manifestation of distress). Subsequently, she began having difficulty with sleep due to worrying thoughts about death and dying. Nicole began using cannabis as a way to facilitate sleep. As a result, she alienated her support systems and her work performance declined, resulting in missed opportunities for promotion.

Over the past year, she began to experience intermittent episodes of abrupt sweating, shortness of breath, and racing heart rate each time she put on her uniform for work. These ongoing symptoms made it impossible for Nicole to maintain focus and continue to work safely as a police officer. She developed a plan to kill herself after her next shift using her personal firearm at home. After informing the department counselor of her plans, Nicole was placed on medical leave and referred for a psychiatric evaluation.

Case Analysis Questions

1. What risk factors does Nicole have in her history that link to anxiety?
2. Referring to Peplau's four levels of anxiety (Table 31.1), which category does Nicole fall into during the past year?
3. What type(s) of psychotherapeutic approaches might Nicole benefit from?

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CONCEPT 32

Cognition

Martha Purvis

The ability to think has long been considered a defining characteristic of what it means to be human. Attesting to this are the words of the French philosopher Rene Descartes, who said, "Cogito, ergo sum," which translates to "I think, therefore, I am." Thus, the understanding of cognition, a term derived from the Latin verb "to think," is essential to understanding human behavior in health and in disease.

The study of cognition is multidisciplinary in scope with involvement and contributions from psychologists, philosophers, linguists, artificial intelligence scientists, and neuroscientists.[1] Two fields exclusively dedicated to the study of cognition are cognitive psychology and cognitive neuroscience. Cognitive psychology is committed to the study of cognition from an information processing perspective while cognitive neuroscience is the combined study of the mind and brain.[2] This concept presentation provides an overview of cognition, including recognition of risk factors for and evidence of impaired cognition, and strategies to manage those with cognitive impairment.

DEFINITION

Cognitive ability can be categorized in several ways. Classification can be done by referring to general processes like memory, attention, language, and executive function. Other classification systems refer to the region of the brain where processes originate and are based on studies of individuals with injury to these areas. Third, a hierarchical form of classification can be used that focuses on the complexity of the operation.[2] For the purposes of this concept presentation, cognition is defined as *the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.*[3] Six domains of cognitive function include perceptual motor function, language, learning and memory, social cognition, complex attention, and executive function.[4] Three related terms—perception, memory, and executive function—are also described here for further clarification. *Perception* is the interpretation of the environment and is dependent on the acuity of sensory input. A related construct is awareness or consciousness, which refers to the ability to perceive or be sensitive to stimuli in the environment and respond to them. Attention is a focus on a particular area of conscious content. It implies selection as well as the ability to direct cognitive effort.[2]

Memory broadly refers to the retention and recall of past experiences and learning. It is not a single, unified mental ability but rather a series of different neural subsystems, each of which has a unique localization in the brain. These different subsystems support different types of memory—namely declarative episodic memory, declarative semantic memory, immediate memory, working memory, and procedural memory. Declarative memory refers to the ability to consciously learn and recall information. When the information relates to specific events, the terminology used is declarative episodic memory. This is distinct from declarative semantic memory, which refers to memory of knowledge, words, and facts.[2] Declarative memory provides for long-term storage of large amounts of information. Immediate memory or "attention span" allows memory of very small amounts of information, such as a series of six or seven digits, for a very short time.[2] Working memory allows a small amount of information (approximately four chunks or meaningful units) to be actively maintained and manipulated for a short period of time. Procedural memory refers to the retention and retrieval of motor skills. It requires extensive training and provides for long-term storage of a moderate amount of information. Related to memory is visuospatial cognition, which is the capacity to comprehend, retain, and use visual representations and their spatial relationships.[2]

Executive function refers to the higher thinking processes that allow for flexibility, adaptability, and goal directedness. Executive function determines the contents of consciousness, supervises voluntary activity, and is future-oriented.[2]

SCOPE

At the most basic level, cognition may be described as intact or impaired. Intact cognition means that an individual exhibits cognitive behaviors within the range of what is considered normal for age and culture. The scope of cognition is shown on a continuum because the level of cognition is not a matter of "all or none"; it can change over time, and if cognitive impairment is present, the degree of impairment can be mild to severe (Fig. 32.1).

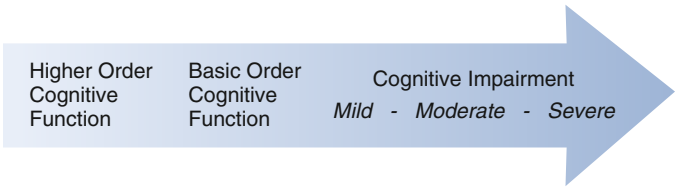

FIG. 32.1 Scope of Concept: Cognition. Ranges from higher-order cognitive functioning to cognitive impairment.

Higher-order cognitive function is characterized by learning, comprehension, insight problem solving, reasoning, decision making, creativity, and metacognition. Basic cognitive functioning includes perception, pattern recognition, and attention. Impaired cognition signifies an observable or measurable disturbance in one or more of the cognitive processes resulting from an abnormality within the brain or a factor interfering with normal brain function.

Among individuals with impaired cognition, there is variability related to the degree of impairment because of a number of influencing variables. In addition to considering the degree of impairment, cognitive changes can also be considered from a time perspective—that is, a temporary state or a chronic (permanent) state. Depending on the underlying cause, chronic states of impaired cognition can remain stable or can be associated with steady decline over time.

NORMAL PHYSIOLOGIC PROCESS

One of the most distinctive features of humans, compared with other forms of life, is advanced cognitive abilities. In the absence of injury or disease, cognitive development occurs throughout life, with the most significant changes from infancy through adolescence. Less dramatic development and maintenance of cognition occurs during adulthood.

There are four major units of the human brain: cerebrum, diencephalon, brain stem, and cerebellum (Fig. 32.2A). The brain is responsible for multiple processes, including those that involve purposeful thought and responses and those that are automated and occur without purposeful thought (e.g., breathing, heart rate, reflexes, hormonal control, temperature regulation, and sensory regulation).

Most cognitive tasks occur in the cerebrum, which is divided into two hemispheres (right and left); each hemisphere has four lobes (frontal lobe, parietal lobe, temporal lobe, and occipital lobe) (see Fig. 32.2B). A key area of the brain that supports cognitive processing is the limbic system, which is a structure that overlaps the cerebrum and diencephalon. The ability to reason, function intellectually, express personality, and purposefully interact with the external environment is a result of a highly advanced brain. The cerebral cortex is primarily responsible for carrying out such functions, in which highly sophisticated neurons and neurotransmitters deliver information through complex networks. The brain is continually involved in receiving internal and external data signals. These signals are integrated and interpreted, which then triggers a sensory or motor response. This process is continuous and automatic.

Cognitive thought requires the ability to take in data signals and actively think about (integrate) and act on the information. Data signals that represent important information are transferred to memory. The hippocampus (a part of the limbic system) plays a significant role in committing information to long-term memory. Anatomic areas that have been identified as playing a key role in specific cognitive functions are presented in Table 32.1.[5] Optimal brain function depends on the continuous perfusion of oxygenated and nutrient-rich blood. Decreases in oxygen and glucose supply, as well as electrolyte and acid–base imbalances, significantly impair cognitive function.

Age-Related Differences

Infants and Children

Significant cognitive development occurs during infancy and childhood. Although the brain stem and spinal cord are fully developed (and needed to sustain extrauterine life), the limbic system and cerebral cortex are in undeveloped states at birth. Thus, newborn infant behavior (e.g., sleeping, crying, feeding,

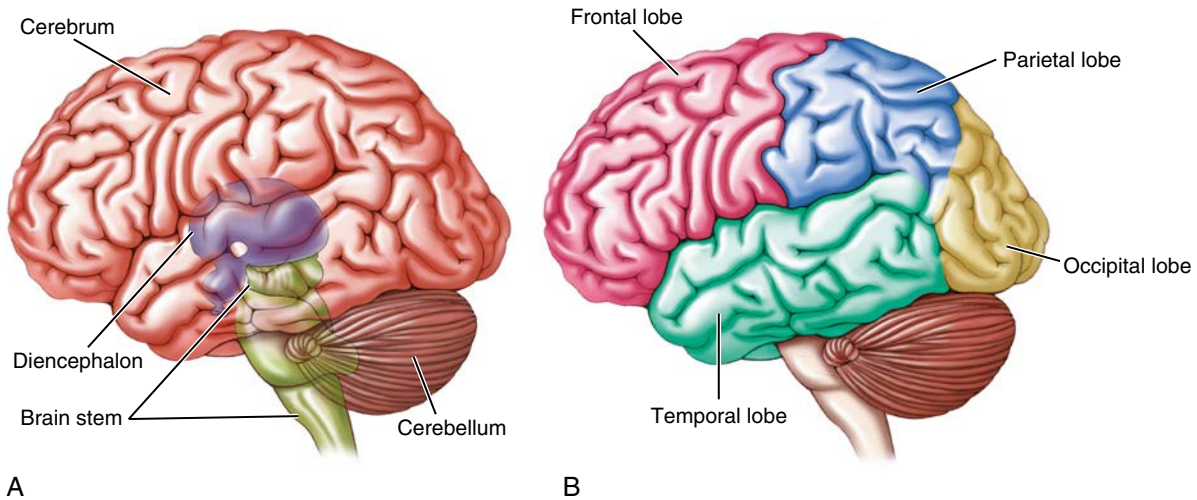

FIG. 32.2 Brain Structures. (A) Four main areas of the brain. (B) Lobes of the cerebrum. (Modified from Herlihy, B. [2014]. *The human body in health and illness* [5th ed.]. St Louis: Saunders.)

TABLE 32.1 Cognitive Function and Associated Anatomic Location in the Brain

Cognitive Function	Anatomic Location
Memory	
Declarative episodic memory	Hippocampus, medial thalamus
Declarative semantic memory	Temporoparietal association cortices
Immediate memory/attention	Primary auditory or visual cortex
Working memory	Lateral frontal cortex
Procedural memory	Basal ganglia, association neocortices
Language	
Receptive language function	Auditory association areas: posterior superior temporoparietal supramarginal gyrus
Expressive language function	Lateral inferior posterior frontal lobes
Visuospatial Cognition	Occipital lobe, inferior temporal and posterior parietal lobes
Executive Function	Network of brain regions anchored by prefrontal and anterior lobe neocortex

sucking, kicking, and other reflexive behaviors) is controlled by the lower brain. The process of cognitive development from infancy throughout childhood has been described by many—perhaps most notable is Piaget.[6] According to Piaget, cognitive development is an orderly and sequential process that occurs in four stages: sensorimotor (birth to age 2 years), preoperational (ages 2 to 7 years), concrete operational (ages 7 to 11 years), and formal operational (age 11 years and older). (Piaget's theory of cognitive development is presented in Concept 1, Development.)

From a physiologic perspective, three primary changes occur that influence the developing brain: increase in brain mass, neuronal-synaptic connections, and myelination. The growth of the brain and development of cognitive processing occur throughout infancy and childhood. The brain itself triples in weight during the first year, representing the single greatest change in brain size after birth. Along with an increase in brain mass, the number of neurons in the brain increases until approximately age 2 years. A massive explosion of neuronal-synaptic connections develops after birth and continues throughout childhood and adolescence, fueling the progression of cognitive developmental milestones. The connections occur in different regions of the cerebral cortex (e.g., sensory cortex, temporal lobes, and frontal lobes) during this time, which explains the various milestone achievements typically seen at different stages of development. Another physiologic change is myelination of the neurons. Myelination occurs with the formation of a myelin sheath around nerve fibers needed for efficient neurotransmission of signals between neurons within the brain. This has a direct effect on cognitive development. Although infants are born with very little myelination, the process of myelination occurs throughout childhood and continues well into young adulthood, allowing for more complex or advanced thought with aging.

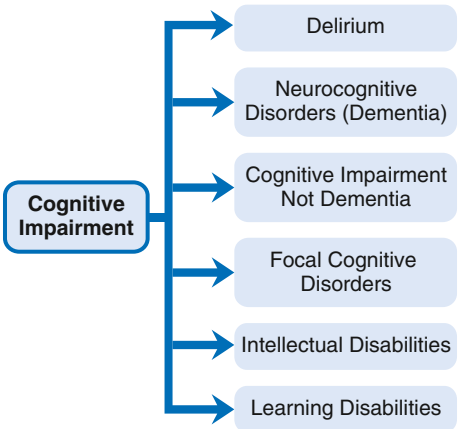

FIG. 32.3 Categories of Cognitive Impairment.

Older Adults

The size and weight of the brain and number of neurons decrease with aging. The reduction in and atrophy of neurons results in less efficient neurotransmission and a slowing of neural responses. However, these normal physiologic changes with aging are not necessarily associated with a loss of cognitive function. In other words, cognitive impairment or intellectual loss is not a part of normal aging; rather, it is indicative of disease.[5] Throughout life, humans retain the ability to learn. The ability to maintain cognitive function is often associated with brain "exercise"—meaning that regular purposeful thought is correlated to cognitive function, particularly among the oldest of older adults. A decline in memory is associated with aging, but the extent and degree are highly variable. Committing new information (particularly complex information) to memory is less efficient in older adults, but most memory functioning remains intact.[7] This is especially true when older adults are in familiar situations and doing things they have done before.

VARIATIONS AND CONTEXT

Cognitive impairment refers to deficits in intellectual functioning. It is estimated that more than 16 million people in the United States have some degree of cognitive impairment.[8] A wide range of categories for cognitive impairment exists. For the purposes of this concept presentation, the following categories are used: delirium, neurocognitive disorders (NCDs), cognitive impairment (not dementia), focal cognitive disorders, intellectual disabilities (IDs), and learning disabilities (Fig. 32.3).[9]

Delirium

Delirium is a state of disturbed consciousness and altered cognition with a rapid onset occurring over hours or a few days, which can present as hypoactive, hyperactive, or mixed. During a delirious state, the individual experiences a dulled awareness of the environment and a reduced ability to focus, sustain, and shift attention. Memory and judgment are impaired, and disorientation may occur. Speech is rapid, rambling, and/or incoherent. Sudden, intense emotional swings, hallucinations, vivid

dreams, and delusions may also occur. Restlessness is common, although in some cases activity may be reduced.

Delirium is the most frequent complication of hospitalization in the elderly population and has been associated with long term functional and cognitive decline.[10] A number of underlying conditions can lead to delirium such as dehydration, electrolyte imbalances, fever, hypoxia, sleep deprivation, adverse effect of medications, and illicit drug use, to name a few. It may also be the initial symptom of life-threatening problems such as pneumonia, urosepsis, or myocardial infarction. Delirium can be reversed with prompt treatment of the underlying problem but prevention through nonpharmacologic interventions produces better outcomes. These include reorientation, attention to sleep and rest, avoidance of overstimulation (light and sound), early mobility and encouraging family participation in care.[10,11]

Neurocognitive Disorders

NCDs refer to a group of disorders better known as dementia. The commonality within these disorders is an acquired and progressive deterioration of all cognitive functions (with little or no disturbance of consciousness or perception), including impairment in memory, judgment, calculation ability, attention span, and abstract thinking. These impairments develop over a period of months to years. Primary dementia is irreversible and not secondary to another disease. Secondary dementia occurs as a result of another disease process.[11] It has long been known that the incidence of dementia is associated with advanced age. However, the prevalence of dementia among older adults over age 70 declined from 13% in 2011 to 10% in 2019, possibly associated with increased educational attainment.[12]

There are many types of dementia that are classified as etiologic subtypes of NCDs.[4] These subtypes include Alzheimer's disease (AD), Parkinson's disease, human immunodeficiency virus (HIV) infection, frontotemporal, Lewy body type, traumatic brain injury, vascular, substance induced, Huntington disease, prion disease, and other medical conditions. Each of these subtypes is classified as major or minor, depending on the degree of cognitive decline and functional ability.[4]

Mild Cognitive Impairment

Individuals with mild cognitive impairment (MCI) demonstrate a greater reduction of cognitive function than expected for an individual's age and education, but it does not interfere with functional ability.[13] Approximately two out of three Americans experience some degree of cognitive impairment as they age, at an average age of approximately 70 years. Women have 7 years of cognitively impaired living, compared with 5 in men. Educational and racial/ethnic disparities are even more profound than gender differences and reveal an uneven social burden of cognitive impairment. Despite the shorter lives of disadvantaged subgroups (Black and/or less educated), they experienced a younger age of onset and spent more years cognitively impaired than their White, higher-educated counterparts. For the most advantaged groups (i.e., White and/or higher educated), cognitive impairment is both delayed and compressed toward the very end of life.[12] Individuals with MCI are at higher risk of progressing to dementia compared with the general population.[12,13] More research is required to clarify the mechanisms driving these disparities in cognitive impairment.

Focal Cognitive Disorders

Focal cognitive disorders, unlike delirium and dementia, affect a single area of cognitive function. The area involved may be memory, language, visuospatial ability, or executive function.[11] These disorders may be associated with an NCD or may be seen independently. For example, one focal cognitive disorder involving memory is an amnestic disorder characterized by a significant decline in the ability to learn and recall new information and to recall previously learned material. This leads to impaired social and occupational function.[11]

Intellectual Disability

Intellectual disabilities (IDs) are defined as *neurodevelopmental disorders that begin in childhood*. These disabilities are characterized by deficits in intellectual functioning (reasoning, problem solving, judgment) and difficulties with adaptive functioning that affect the ability to remain independent and meet sociocultural standards.[4] ID differs from NCDs in that cognitive processing never fully develops, and the symptoms are identified before age 18 years. ID is described on a scale from mild to profound. Most people with ID are in the range of mild to moderate, with the ability to learn new tasks and live independently. Individuals with severe ID require daily support and more structured settings. Those with profound ID are fully dependent, need help with self-care, and often have communication and physical limitations.[4] Common IDs include chromosomal abnormalities (e.g., Down syndrome), genetic/inherited conditions (e.g., fragile X syndrome and Tay-Sachs), and other conditions that damage the developing brain (e.g., exposure to toxins, malnourishment, and cerebral anoxia).

Learning Disability

Learning disabilities (LD) are caused by genetic and/or developmental factors that affect brain functioning, especially in cognitive processing. Basic learning skills, such as reading, writing, and math, can be affected, as well has higher level skills such as time management, attention, abstract reasoning, and organizational planning. The effects can affect not only the formal learning environment but also relationships with other people. Learning disorders occur among individuals having average or above-average intelligence, which is an important distinction compared with IDs. Like IDs, the severity of impairment ranges from mild to profound and can involve one or more areas of learning, including speaking, listening, reading (skills and comprehension), writing, and mathematics (calculation and reasoning).[4]

CONSEQUENCES

The consequences of cognitive impairment can be devastating for the affected person and for family and friends. Cognitive impairment places an individual at significant risk for adverse physical, psychological, and social outcomes. Individuals with cognitive impairment, particularly those with dementia, are at

higher risk for injury due to falls and other injuries within the environment due to the lack of accurate perceptions, risk recognition, and/or lack of capacity for an appropriate response to dangerous situations. Impaired cognition also complicates disease management, making optimal health management a challenge.[10] Cognitive impairment is associated with a higher incidence of hospitalization and long-term care.[9] Advanced forms of cognitive impairment affect functional ability, the patient's capacity for independent living, and normal social interaction. The need for assistive services can range from help with instrumental activities of daily living to constant supervision and complete care. Financial hardship and caregiver burden can result.

RISK FACTORS

Preventative interventions aimed at modifiable risk factors and risk recognition are an essential strategy with cognitively impaired patients. Early identification of cognitive impairment is also essential. There are many types of cognitive impairment and many causes of each, with a wide array of risk factors, not all of which apply to every case.

Populations at Risk

Individuals across all population groups are potentially at risk for developing cognitive impairment. Results of several studies indicate that a primary risk factor for cognitive impairment is advancing age.[12] Moreover, the primary age group at risk is the elderly population.[13] No differences in impairment have been found across populations based on race, ethnicity, or gender; however, correlated risk factors among women and men differ, thought to be related to sociodemographic and environmental factors that affect cognition.[14] Educational and social disparities have a profound effect on overall health, which in turn leads to higher risk for cognitive impairment.[14] Significant risk factors found for women are overall poor health status, dependency, lack of social support, and insomnia. Risk factors specific to men include a history of stroke or diabetes.[14]

Although the primary population at risk is the elderly, a number of pediatric risk factors exist in prenatal, perinatal, and postnatal periods, including genetic syndromes, toxicity and metabolic conditions, maternal disease, events during labor leading to hypoxic ischemic injury, and brain malformation.[15]

Individual Risk Factors

Many individual risk factors are associated with impaired cognition. The most common factors are personal behaviors, environmental exposures, congenital or genetic conditions, and other health-related conditions.

Personal Behaviors

Personal behaviors that predispose to impaired cognition are those related to chemical exposure and substance abuse (e.g., alcohol, amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phencyclidine, sedatives, hypnotics, and anxiolytics). Accidental injuries associated with work, recreation, or violence in the absence of high-risk behaviors can also lead to brain injury and cognitive impairment. Individuals at risk are those who have experienced traumatic brain injury, including military veterans, professional athletes, and those who have had concussions while engaging in contact sports. Recent studies show that even one episode of injury can result in long-lasting impairments in cognitive function in both adults and children.[16] Those who participate in high-risk activities or omit basic safety measures, such as wearing a helmet while skiing, cycling, motorcycle riding, or rock climbing, are at increased risk. Failure to use a seat belt (or seat restraint for children) when riding in vehicles also puts one at risk.

Environmental Exposures

Environmental exposures to toxic substances can negatively impair cognitive function. Despite changes in environmental regulations, lead exposure continues to be a problem due to the presence of lead in the soil and dust, as well as old lead-based paint. Lead exposure among young children is particularly concerning because the developing brain is especially vulnerable. Other chemical agents, such as pesticides, can also negatively impair cognitive function.[9]

Congenital and Genetic Conditions

The term *congenital* means "present at birth"; genetic conditions differ in that the genetic problem exists at birth, but the condition may or may not be present at birth, manifesting later in life. Many congenital and genetic conditions are associated with impaired cognition. Some are related to maternal conditions (e.g., fetal alcohol syndrome or cocaine or methamphetamine exposure), and some are caused by birth injuries (e.g., cerebral palsy). Cognitive impairment also results from many chromosomal abnormalities (e.g., Down syndrome or fragile X syndrome) or other genetic conditions evident in infancy (e.g., phenylketonuria and galactosemia)[17] or those that emerge later in life (e.g., Huntington disease, in which mental deterioration begins typically in the fourth decade of life).

Physical Disability and Reduced Mobility

There appears to be a relationship between physical disability and a decline in cognitive function, especially with advancing age. Changes in gait, especially slow gait speed, is considered a predictor of cognitive decline, particularly executive function.[18] Changes in cognition can predict problems with gait and risk for falls.[19]

Underlying Health Conditions

Many health conditions can lead to temporary or long-term impairments in cognition. Fluid and electrolyte imbalance, systemic or intracranial infection, fever, pain, hypoglycemia, and anoxia can cause delirium that is reversible with treatment of the precipitating cause. Stroke and intracranial tumor can cause irreversible long-term amnestic and other cognitive impairments. Many chronic conditions, such as heart disease, chronic pulmonary disease, and stroke, have also been found to be significant risk factors for cognitive impairment in both men and

women. Individuals with type 2 diabetes, folic acid deficiency, and metabolic syndrome have been shown to have higher risk for cognitive impairment.[13,18]

Changes in cognition may occur as an adverse effect of medical treatments and medications. This is a particular risk among the elderly population because of decreased physiologic reserve, decline in hepatic and renal function, altered metabolism, the presence of chronic disease, and multiple drug regimens. Psychoactive drugs are particularly notorious—these agents can cause delirium or cognitive decline. Examples include sedative-hypnotics (especially the long-acting benzodiazepines (such as valium), narcotics (especially meperidine), anticholinergics (e.g., antihistamines, antispasmodics, heterocyclic antidepressants, neuroleptics, and antiparkinsonians), digitalis glycosides, antidysrhythmics (e.g., quinine and procainamide), and antihypertensives such as β-blockers. H_2-antagonists, nonsteroidal antiinflammatory drugs, corticosteroids, and anticonvulsants, as well as over-the-counter sleep aids, cold and sinus medications, and antinausea and acid reflux preparations, can also lead to changes in cognition. Chemotherapy, used to kill cancer cells, has been shown to impair normal brain function—a long-term consequence referred to as chemo-brain.[13]

Mood disorders like anxiety and depression, even in midlife, are associated with a doubled risk for developing dementia.[20] Later in life, anxiety and depressive symptoms can mimic symptoms of cognitive impairment by affecting an individual's ability to process new information. Studies show direct effects of mood on cognition and memory, affecting executive function and processing speed.[2,20]

ASSESSMENT

Characteristics of normal cognitive status vary with the individual's stage of development. In infants and young children, expected cognitive development is indicated by achievement of developmental milestones and tasks, with specialized age-appropriate tests of development used when indicated to determine developmental delays (see Concept 1, Development). During the remaining life span, identification of new problems with cognition relies primarily on routine observations by healthcare providers, patient self-report, and report of family or others.

History

Adults

Questions related to cognition include age, educational level, a history of intracranial disease or trauma; substance abuse; use of medications that can impair cognition; environmental or occupational exposure to hazards such as lead or insecticides; the presence of symptoms such as difficulty in forming words or saying what is meant, headache, behavior changes, or seizures suggestive of a brain disorder; emotional or behavioral changes; and any noticed change in memory or mental function. If any abnormalities are noted, a more specific cognitive assessment is perfomed.[13,21] A family member who can assist with the history helps to provide greater understanding of the patient's cognitive level and provide a timeline for determining whether changes are acute or gradual.

Infants and Children

Intellectual disability may have an association with the pregnancy or birth process. Parents should be asked about prenatal and birth history, in addition to a three-generation family health history (to establish familial syndromes).[17] Assessment of developmental tasks met and those not met provide helpful clues regarding impairment.

Examination

Physical assessment of cognitive functioning occurs while obtaining the health history. It begins with assessment of consciousness because unless the patient is fully aware of self and the environment, other cognitive assessments may not be valid. The exam should include general appearance, behavior, and cognitive function. The nurse observes the patient for wakefulness, alertness, and appropriate responses to introductions and to the environment as the health history interview is begun. The patient's speech pattern and content are noted, and memory, logic, and judgment are assessed while the interview progresses.[22]

General Appearance

Observation of general appearance often provides initial clues to an individual's cognitive functioning. The posture and body movements should be relaxed, coordinated, and smooth. Slumped posture, slow movements while walking, and dragging feet may be indicative of dementia. Observe the patient's dress and overall hygiene, and consider if it is appropriate for the weather, setting, gender, and age. Individuals with cognitive impairment may present with inappropriate dress and/or poor hygiene.

Behavior

Assess the level of consciousness. The expected finding is an individual who is awake, alert, and aware of the environment. Abnormal findings include lethargy, obtunded, stupor, or confusion.

Facial expressions should be appropriate and consistent with the situation. Flat expressions could be associated with dementia. Note the quality of speech. Expected findings include effortless conversation that is fluent, articulate, and of moderate pace. Individuals with impaired cognition may have trouble recalling words, blocking, distorted speech, disconnected sentences, or loose associations. Confabulation (the fabrication of events to fill in memory gaps) may also be demonstrated.

Assessment of Cognitive Function

Formal assessment of cognition goes further to include a test of orientation to person, place, and time and also attention, memory, judgment, insight, spatial perception, calculation, abstract reasoning, thought process, and content. Orientation is usually established during the course of the interview by asking the patient to state his or her name, provide date of birth, state, address, etc. Typically, a patient is considered orientated if he or she is aware of the date, time, and location.

The Mini-Mental State Exam (MMSE) is one of the most common standardized cognitive assessment tools used across care settings to screen for dementia, to detect cognitive impairment occurring during illness, and to monitor response to treatment. The test consists of 11 cognitive tasks that cover the categories of time orientation, place orientation, immediate recall, short-term

memory recall, serial 7s, reading, writing, drawing, and verbal/motor comprehension. The test takes 5 to 10 minutes and is simple to administer. The lower the score (out of a total of 30), the more severe the impairment. Individuals who score less than 27 should be referred for further evaluation.[21] The Montreal Cognitive Assessment (MoCA) is an excellent tool for assessment of early cognitive impairment, especially in those with advanced education.[21-23] Another simple cognitive assessment tool for memory impairment is the Three Words Three Shapes test. It requires recall of three words written down by the patient followed by three shapes drawn by the patient.[21] For hospitalized patients with delirium, a short screening test called the Confusion Assessment Method (CAM) (CAM-ICU for patients who are unable to speak as a result of intubation) is used.

Several other assessment tools are available for use in clinical practice that assess various aspects of cognitive skills; some of these are listed in Box 32.1. Regardless of the tests used, adults should be able to evaluate and respond appropriately in situations requiring judgment; demonstrate a realistic insight into self; state the abstract meaning of a metaphor appropriate to their culture; and exhibit logical, coherent, and goal-directed thought processes based on reality.[24] Adults with normal cognition have an attention span and calculation ability adequate to complete a task such as counting backward from 100 by subtracting 7 each time. Short-term memory allows functions such as repeating a list of three words after 5 minutes of another conversation. Long-term memory allows for correctly responding to questions about events occurring 24 hours or more in the past.

Adults with intact cognitive processes also exhibit spatial perception sufficient to allow copying of a simple shape without difficulty and identify right and left sides of the body. Observable behaviors associated with altered cognition have been well documented, named, and defined. Terms used to describe abnormal cognitive findings are presented in Table 32.2.[2,13] Cognitive assessment of infants and children also includes behavioral, cognitive, and psychosocial development. This is presented in Concept 1, Development.

Diagnostic Tests

There are no laboratory tests that diagnose cognitive impairment, although laboratory tests are critical in determining the presence of associated disease or contributing factors. For example, a laboratory test can detect an electrolyte imbalance or urinary tract infection, which may be the underlying cause associated with an acute state of confusion. Brain imaging techniques such as magnetic resonance imaging and positron emission tomography (PET) scans can identify some brain abnormalities such as intracranial tumors, infarcts associated with vascular dementia, and frontotemporal lobe atrophy. However, their usefulness is limited in most cases of cognitive impairment. Formal neuropsychometric testing by a neuropsychologist is needed for the identification of mild cases of cognitive impairment or to further clarify whether psychiatric, personality or mood disorders may be contributing to alterations in mental processing. Such testing uses more detailed standardized tests of memory and advanced methods of determining visuospatial function, which can identify impairments missed by standard clinical evaluation tests.[13]

BOX 32.1 Common Cognitive Assessment Tools

Global Cognitive Performance

- *Mini-Mental State Examination (MMSE):* A 30-item, 10-minute questionnaire to measure cognitive impairment and progression of disease.
- *Montreal Cognitive Assessment (MoCA):* Developed as a more challenging test than the MMSE, includes executive function, higher level language and visuospatial skills to detect mild impairment.
- *Severe Impairment Battery (SIB):* Used with significantly cognitively impaired patients to assess lower levels of cognitive function; in other words, provides differentiating clarity among individuals who score less than 12 on the MMSE.

Executive Functioning

- *Controlled Oral Word Association Test (COWAT):* Assesses ability to generate a list of as many words starting with a designated letter as possible in 1 min. Tests attention, thought process, judgment, aphasia and memory, ability to adhere to a set of rules to assess attention, thought process, and judgment.
- *Behavioral Dyscontrol Scale (BDS):* Nine-item screening test to evaluate the capacity of an older adult related to independent functioning. The tool evaluates motor control processes and insight regarding accuracy of performance.

Motor Speed

- *Hand Tapping Test:* Used to evaluate motor speed and involves tapping the hands. Slowed tapping speed is associated with cognitive impairment.

Episodic Memory

- *Three Words Three Shapes Test:* Measures memory, recall, and recognition using verbal and nonverbal information.
- *Fuld Object Memory Evaluation:* Tests for recognition, memory, and learning in older adults. Ten objects in a bag are presented to individuals who are asked to identify the objects by touch (stereognosis) and then allowed to see if they were correct. After a few minutes, they are asked to recall the things in the bag.

Cognitive Impairment

- *Global Deterioration Rating Scale (GDRS):* Behavioral rating scale assessment for three phases of cognitive impairment: forgetfulness, confusion, and dementia.

CORE COMPETENCIES

Cognition

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to cognition.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to cognition.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to immunity for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to cognition.
- Educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to cognition.
- Demonstrate clinical judgment founded on broad knowledge of cognition.

TABLE 32.2 Common Cognitive Functional Abnormalities and Definitions

Cognitive Area	Abnormality	Definition
Memory	Anterograde amnesia	Loss of ability to learn and recall new information on an ongoing basis
	Retrograde amnesia	Impaired ability to retrieve information from the past
Language	Aphasia	Language impairment at the conceptual level; may have difficulty with production or comprehension of language or both
	Wernicke aphasia	Impaired comprehension of both written and verbal language, even understanding single words; speech fluent and person is unaware that words used are incorrect
	Broca aphasia	Impaired language expression characterized by nonfluent, labored speech; comprehension of language intact
	Global aphasia	Both language reception and expression are impaired
	Anomia	Impaired ability to name places or objects; may have difficulty with sentence repetition, although comprehension and expression abilities are basically intact
Visuospatial	Alexia	Impaired reading ability
	Agraphia	Inability to write
	Agnosia	Impaired ability to recognize objects or persons through sensory stimuli; may be visual, tactile, auditory, olfactory, or gustatory
	Object agnosia	Impaired ability to recognize visual forms
	Prosopagnosia	Impaired ability to recognize faces
	Simultanagnosia	Impaired ability to integrate complex visual scenes
	Apraxia	Inability to perform purposeful movements or manipulate objects, although sensory and motor ability is intact
	Constructional apraxia	Inability to reproduce figures on paper
	Ideomotor apraxia	Inability to translate an idea into action
	Hemispatial (unilateral) neglect	Inability to process and perceive stimuli on one side of the body or the environment despite intact senses; results in a deficit in attention and awareness to the affected side
Calculation	Dyscalculia	Inability to perform calculations correctly
Abstract reasoning	Conceptual concreteness	Inability to describe in abstractions, generalize, or apply principles
Thought process and content	Flight of ideas	Topic of speech changes within a sentence
	Confabulation	Making up answers without regard to facts
	Circumstantiality	Indirect speech characterized by countless details and explanations with resultant prolonged time to reach point
	Echolalia	Involuntary repetition of a word or sentence spoken by someone else
	Clanging	Use of meaningless, rhyming words
	Blocking	Unconscious interruption in the train of thought manifested as a sudden obstruction to the spontaneous flow of speech
	Pressured speech	Frantic, energetic, jumbled speech; speech trying to keep up with thoughts
	Word salad	Meaningless mixture of words or phrases

CLINICAL MANAGEMENT

Nursing practice has four major dimensions of concern relative to an individual's cognitive status: recognition of risk for impaired cognition, cognitive assessment, the planning and delivery of individualized care appropriate to level of cognitive ability, and evaluation of outcomes.

Primary Prevention

Promoting a healthy lifestyle—including optimal nutrition, exercise, social activity, regular medical care to prevent and/or manage chronic diseases, avoidance of substance abuse (especially during pregnancy), and other high-risk behaviors—through teaching and community programs is basic to prevention across the spectrum of cognitive impairment. These measures are essential for healthy pregnancies, optimal growth and development into adulthood, and healthy aging.

Genetic counseling is another primary prevention strategy used to identify risk factors for disorders characterized by impaired cognition. This ranges from pregnancy risks associated with advanced maternal age (e.g., Down syndrome) to genetic testing for inherited disorders (e.g., Huntington disease) that could affect decisions about having children.

Primary prevention specific to delirium involves educating healthcare providers about changes in practice that can decrease vulnerability to the disorder. Practices that constitute risk factors for delirium, such as use of sleeping medications, use of urinary catheters, and avoiding prolonged immobilization, need to be identified along with alternative methods of care.[10]

Secondary Prevention (Screening)

Secondary prevention, or screening, refers to periodic assessment of specified population groups to detect early onset of a condition. Several screening tests to assess cognitive function were presented in the Assessment Section and Box 32.1. According to the U.S.

Preventive Services Task Force,[24] the current evidence is insufficient to recommend for or against routine screening of cognitive impairment in older adults. Likewise, no routine screening tests are recommended for early detection of intellectual disability.

Collaborative Interventions

Cognition is a consideration in virtually all areas of health care and for all members of the healthcare team. It is a critical element in communicating with the patient and in the determination of care.[10] It is also critical to discharge planning from acute care facilities and is one determinant of need for home care services or placement in a long-term care facility.

The focus of treatment varies, depending on the underlying cause of the cognitive impairment. Clearly, the management of a child with intellectual disability differs from the focus of care for an older adult with dementia. In some cases, the treatment of a precipitating trauma or disease is possible, but in many cases of cognitive impairment, the disease process is not well understood and no treatments or only treatments with limited effectiveness are available. However, several underlying principles apply to all individuals with intellectual impairment. For example, regardless of the cause, management of the patient with cognitive impairment involves a multidisciplinary effort. Depending on the type and cause of the impairment, one or more of the following services may be required: nursing, medicine, physical therapy, occupational therapy, social work, psychological intervention, individual and/or family counseling, nutritional consulting, speech and language services, audiology services, home health or homemaker assistance community services such as day care, caregiver support groups, and assistive technologies.

General Management Strategies

Promoting adequate rest, sleep, fluid intake, nutrition, elimination, pain control, and comfort are essential elements of care for persons with cognitive impairment. Also of great importance is ensuring an appropriate level of environmental stimulation. Excessive stimulation can create agitation and confusion, whereas a lack of stimulation can result in sensory deprivation effects and withdrawal. If behavior is a problem, attempts should be made to identify and manage environmental triggers while avoiding the use of physical and pharmacologic restraints.[10]

All patients with cognitive impairment benefit from predictable routines, consistent caregivers, simple instructions, eye contact, and the presence of familiar people and objects. Sensory aids such as eyeglasses and hearing aids should be used consistently to maximize accurate sensory input. To the extent possible, patients should be involved in self-care and decision making even if the latter is limited to deciding which of two shirts to wear or whether to drink milk or juice. Verbal reorientation to time and place should be provided if needed, and a clock and calendar should be within easy vision. For patients with delirium or who are otherwise agitated, a private room, soft music, relaxation tapes, or massage can be helpful.

Safety is a priority concern for all patients with cognitive impairment. Precise interventions needed vary with the person's age, developmental status, and degree of impairment. Patients should not drive, use machinery, or handle firearms, and the environment should be kept free of potential hazards. Supervision is needed with activities such as cooking or taking medications. If the patient wanders, an identification tag or bracelet should be worn or, if appropriate, a wander guard device should be used.

Pharmacologic Agents

The two classes of drugs used in the treatment of Alzheimer disease (AD) are the cholinesterase inhibitors and NMDA receptor antagonists. The three cholinesterase inhibitors approved by the U.S. Food and Drug Administration for the treatment of AD are donepezil (Aricept), rivastigmine (Exelon), and galantamine (Razadyne). The NMDA receptor agonist is memantine (Namenda). Unfortunately, the benefits of these medications are modest, at best. In studies, donepezil and memantine improved global cognitive function in some patients in the short term, but not at a statistically significant level, and long-term benefit was not reported. These medications have significant side effects, primarily GI upset and weight loss and can contribute to polypharmacy issues.[13,24] Vascular dementia is not improved by these agents, but they may have a role in managing behavior. In patients with cognitive impairment, pharmacologic management primarily targets the treatment of associated diseases and to control behavioral alterations such as sleeplessness, anxiety, agitation, and depression.[18]

Nonpharmacologic Interventions

Although no clear disease-modifying medications have been identified, there are general principles in the management of dementia that can help guide patients and caregivers. Exercise, intellectual stimulation, and socialization improve cognition and overall quality of life.[25] Interventions are geared toward modifying the environment to suit the cognitive abilities of the patient; protecting the patient from exploitation, loneliness, or abuse; and limiting activities that could injure them, such as driving and self-management of medication.[26]

Family and Caregiver Support

Engaging family members or significant others in goal setting and care planning is an essential component of care. Advanced planning is encouraged, and caregiver needs for education and support should be recognized and addressed. Information about support groups, respite options, day care, and other community services is provided. Parents of a child born with intellectual disability require a great deal of support, particularly when they learn their child will have lifelong special needs. Caregivers of individuals with intellectual disability and dementia should be referred to support groups and other community resources.

INTERRELATED CONCEPTS

Because cognition depends on the interplay of multiple elements within the physical, psychological, and social dimensions and because it allows for purposeful interaction with the environment, a multitude of concepts can be identified as influencing

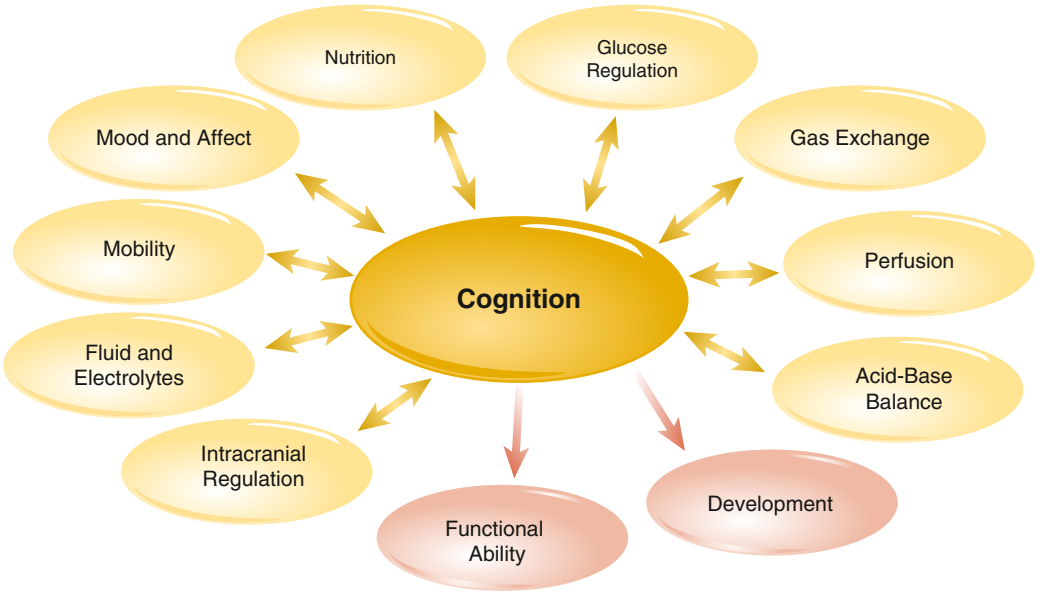

FIG. 32.4 Cognition and Interrelated Concepts.

and/or being influenced by it. Fig. 32.4 depicts the most prominent of these interrelationships. The physiologically focused concepts of **Glucose Regulation, Mobility, Mood and Affect, Nutrition, Gas Exchange, Perfusion, Intracranial Regulation, Fluid and Electrolytes**, and **Acid–Base Balance** have a clearly reciprocal relationship with cognition. These concepts are represented in Fig. 32.4 by the ovals surrounding the upper half of the cognition conception and double-headed arrows because of their mutual interaction with it. The concepts of **Functional Ability** and **Development** are shown at the very bottom of the figure, with arrows pointing from cognition to them because of the primarily unidirectional relationship of these concepts.

CLINICAL EXEMPLARS

Exemplars of impaired cognition are classified into categories described previously in this chapter and include delirium, NCDs, focal cognitive disorders, intellectual disability, and learning disability; these are presented in Box 32.2. Although it is beyond the scope of this textbook to present each of these exemplars in detail, brief descriptions of the most important exemplars are featured here. Refer to other resources, particularly a pediatric and geriatric textbook, for a more comprehensive presentation of these conditions.

Featured Exemplars

Delirium

Delirium is a state of disturbed consciousness and altered cognition. Three categories of delirium exist: hyperactive delirium, hypoactive delirium, and mixed. Delirium is caused by a number of variables. Some of the most common causes include pharmacologic agents (particularly when four or more pharmacologic agents are given in combination), metabolic dysfunction, dehydration, electrolyte imbalance, hypoglycemia, renal impairment, urinary infection or retention, fecal impaction, hypoxia, acute illness, infection, and trauma.[10,27]

BOX 33.2 EXEMPLARS OF IMPAIRED COGNITION

Neurocognitive Disorders
- Alzheimer's disease
- Vascular neurocognitive disorder (NCD)
- Frontotemporal NCD
- Lewy body dementia
- Parkinson's disease (PD)
- Human immunodeficiency virus–associated NCD
- Prion disease
- Traumatic brain injury
- Substance-induced NCD
- NCD due to other medical conditions

Cognitive Impairment, Not Dementia
- Mild cognitive impairment (MCI)
- Postconcussion syndrome

Focal Cognitive Disorders
- Amnesia
- Aphasia

Intellectual Disability
- Down syndrome
- Fragile X syndrome
- Prader-Willi syndrome
- Galactosemia
- Hunter syndrome
- Phenylketonuria
- Rett syndrome
- Tay-Sachs disease
- Fetal alcohol syndrome
- Congenital hypothyroidism

Learning Disability
- Dyslexia
- Dyscalculia
- Dysgraphia
- Dyspraxia

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Alzheimer's Disease (AD)

AD is the most common form of dementia among individuals older than age 65 years, and it is the sixth leading cause of death among adults aged 18 years or older. Estimates vary, but experts suggest that up to 5 million Americans aged 65 years or older have AD, and this number is expected to double by 2050 as the population ages.[13] It is thought that AD is caused by a combination of tau protein clumps that form inside neurons and amyloid plaques that form in spaces between brain cells,

leading to neuronal dysfunction and death. Symptoms include a combination of deficits, including loss of memory, language skills, visual perception, focus, attention, reasoning skills, and functional ability.[13]

Vascular Dementia

Vascular dementia, also known as vascular cognitive impairment (VCI), is the second most common type of neurocognitive impairment. VCI results from damage to cerebral blood vessels and can be caused by a number of underlying conditions. Vessel damage can be associated with stroke or other conditions affecting the vasculature, such as diabetes, hypertension, and plaque formation from hyperlipidemia. Reduced or loss of perfusion leads to death of neurons affected. The risk for VCI parallels risk for stroke—in fact, stroke is the greatest risk factor. VCI has a higher mortality rate compared with AD because of the coexistence of underlying vascular disease; VCI is also associated with greater limitations in activities of daily living compared with AD.[13]

Lewy Body Dementia

The third most common form of dementia, Dementia with Lewy bodies (DLB), is a type of synucleinopathy, or neurodegenerative disorder characterized by the formation of balloon-like protein structures inside the neurons. Early symptoms, which can appear as early as a decade before dementia diagnosis occurs, include loss of smell, visual hallucinations, and difficulty sleeping. These symptoms are often attributed to other causes. Once dementia occurs, symptoms of DLB are similar to those of AD, and parkinsonian signs and symptoms are often noted.

Fetal Alcohol Syndrome (FAS)

Fetal alcohol syndrome (FAS) is a disorder, caused by maternal alcohol intake, that leads to intellectual disability. Alcohol crosses the placenta, exposing the fetus to alcohol, which can lead to disruption of fetal development. Early studies estimated the incidence to affect 0.2 to 1.5 for every 1000 live births. A more recent study of first graders in four different communities conservatively estimated the incidence to be much higher: 1.1% to 5%.[28,29]

Children with FAS have growth deficits, distinctive facial features, and central nervous system (CNS) abnormalities. Because alcohol affects CNS development, individuals with FAS often have problems with one or more of the following: learning, memory, attention, communication, vision, and hearing.[28]

Down Syndrome

Down syndrome is the most common type of chromosomal abnormality. Down syndrome is usually caused by an extra chromosome 21 (referred to as trisomy 21), although in a few cases it may be caused by translocation of chromosomes 15, 21, or 22. The distinctive features of Down syndrome lead to identification and diagnosis at birth. This condition is associated with intellectual disability (ranging in severity from mild to profound) and many other physical conditions, especially congenital heart malformations. The prevalence of Down syndrome is approximately 1 in 700 births, with a sharp rise as the mother's age increases, particularly after age 35 years.[30]

CASE STUDY

From BakiBG/iStock/Thinkstock.

Case Presentation

As part of a community health awareness event, a community health nurse has presented a program on problems associated with aging and their management; the nurse is available for meetings with individuals who have questions or concerns. One of the persons requesting a meeting was a middle-aged woman named Karen, who expressed concern regarding her mother's condition and asked for guidance. Karen explained that her 79-year-old mother, Ruby Long, lives with her and has become increasingly difficult to manage during the past 8 to 10 months. Karen states that her mother has become lax in her hygiene, is very forgetful of details of recent events, seems to be focused only on herself and unconcerned with anyone else's needs, is unwilling to try new things or go new places, and has lost interest in activities that she formally enjoyed. Karen also tells the nurse that her mother sometimes makes what appear to be poor decisions, has trouble managing money, and becomes very upset if any mistakes are mentioned. Upon further questioning, the nurse learns that Ruby Long has hypertension (for which she takes a diuretic), osteoporosis, and has spinal stenosis that often causes back pain. She wears eyeglasses (last eye exam 2 years ago) and has difficulty hearing (but does not use a hearing aid). Ruby has a family physician; her last visit was approximately 1 year ago. Karen tells the nurse that her grandparents and two aunts on her mother's side had dementia, although she is not exactly sure exactly what caused dementia in her relatives.

The nurse encourages Karen to arrange for Ruby to have a complete physical examination to rule out a physical cause of the behaviors and to determine the presence of any comorbidities, including a hearing and vision examination (to determine whether the observed problems are resulting from changes in sensory perception). This physical should include depression and cognitive screening. The nurse stresses the importance of maintaining a safe environment for Ruby.

Case Analysis Questions

1. What risk factors for impaired cognition are present for Ruby Long?
2. Consider the scope of cognition. Based on what you know from the case, where does Ruby Long fit on the continuum?
3. Consider the suggestions made by the nurse. What else might be offered to Karen?

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CONCEPT 33

Psychosis

Kelly Higdon and Sean P. Convoy

Much like many other psychiatric experiences, psychosis has been misjudged, misunderstood, and mislabeled for centuries. Society's relative lack of understanding of psychosis produces rich soil from which stigma and social injustice have traditionally grown. The purpose of this concept presentation is to introduce the basic elements of psychosis for application into nursing practice, with a secondary intent to strip away commonly held misperceptions and illuminate the evidence so that the nurse is better able to understand psychosis and those it affects.

DEFINITION

Although psychosis has not appreciably changed over the centuries, human understanding and the subsequent definition of it have changed considerably. One of the oldest medical references, written in 1500 BC, the Egyptian Ebers Papyrus, spoke generally to what would later be referred to as psychosis in a chapter titled "The Book of Hearts," crudely defining it as a "madness" born of "poison, demons, fecal matter and blood trouble."[1] During the Middle Ages, the treatment of those with psychosis was undistinguished from that of criminals, commonly involving physical punishment and torture. When torture did not "cure" the psychosis, witchcraft was then conveniently suspected.[2]

The term *psychosis* was formally coined in 1845 and synonymously linked with terms such as *mental handicap* and *psychopathy.*[3] Although the present-day understanding and tolerance of psychosis have unquestionably improved, society's persisting fear and misunderstanding of it continue to complicate an already complex condition.

The *Diagnostic and Statistical Manual of Mental Disorders,* fifth edition-TR (DSM-5-TR), currently defines psychosis as abnormalities in five different symptomatic domains: delusions, hallucinations, disorganized thought, disorganized or abnormal motor behavior, and negative symptoms.[4] A psychobiological definition of psychosis would implicate dopamine and glutamate dysregulation between the limbic system and prefrontal cortex. Stahl defines psychosis as "a syndrome, that is, a mixture of symptoms, that can be associated with many different psychiatric disorders, but is not a specific disorder itself…." Stahl also delineates that psychosis involves positive symptoms, namely delusions and hallucinations, and negative symptoms, namely diminished emotional expression and decreased motivation.[5] Each definition provides a unique but arguably incomplete description of this complex state. For the purpose of this concept presentation, the concept of Psychosis is defined as *a syndrome of neurocognitive symptoms that impairs cognitive capacity, leading to deficits of perception, functioning, and social relatedness.*

SCOPE

The scope of psychosis exists along a continuum ranging from absence of psychosis to severe psychosis (Fig. 33.1). Between the extremes, there exists a line of demarcation where the symptoms are of sufficient intensity, duration, and degree of functional impairment to be considered clinically significant. Symptoms that exist below this threshold are consequently referred to as subclinical. Like most health states, psychosis is not static. Rather, psychosis is best conceptualized in the form of a distinct episode of clinically significant symptoms. The frequency of psychotic episodes is contingent on the etiology of the psychosis. Psychosis can be acute in onset and relatively short in duration, as can be seen with a delirium or substance-induced psychotic episode. Likewise, psychosis can be chronic, as can be seen with schizophrenia or schizoaffective disorder.

NORMAL PHYSIOLOGIC PROCESS

Under no circumstances should the symptoms associated with psychosis be considered "normal" or acceptable. Normal physiology is defined by the absence (or reduced number) of vulnerability gene mutations that influence the development of critical neural pathways in the brain. In other words, in the absence of critical gene variations, the critical neural circuits in the brain develop and mature. The normal regulation of dopamine within the mesocortical and mesolimbic pathways affected by both the normal activity of N-methyl-D-aspartate (NMDA) receptors in the prefrontal cortex and the normal regulation of serotonin at 5HT2A receptors in the cortex would reflect the absence of psychosis.[5]

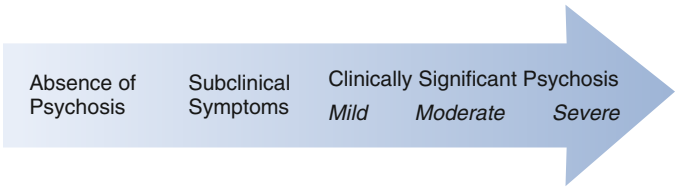

FIG. 33.1 Scope of Concept: Psychosis. The concept of psychosis ranges from an absence of psychosis to severe psychosis.

VARIATIONS AND CONTEXT

Etiologies of Psychosis

Psychosis can manifest from varied etiologies and can be categorized as either primary or secondary in origin. *Primary* psychosis has a psychiatric etiology, as can be seen in schizophrenia, schizoaffective disorder, and, in some instances, other psychiatric illnesses. *Secondary* psychosis has a medical etiology, as can be seen in acute substance intoxication, delirium, or dementia. Primary and secondary forms of psychosis are not mutually exclusive; not only do they coexist but, in some instances, they can also potentiate one another. Absent a primary source of psychosis, individuals who manifest secondary psychosis have greater potential to recover from a psychotic episode without clinically significant sequelae. Those with a primary etiology of psychosis are more likely to manifest subsequent episodes of psychosis due to the predisposing genomic variations and subsequent compromises of the neural circuit that subsume the condition.

Primary Psychosis

Schizophrenia spectrum and other psychotic disorders. Within the classification of "Schizophrenia Spectrum and Other Psychotic Disorders," psychosis is the principal symptom of interest. Clinical disorders in this category include delusional disorder, schizophreniform disorder, schizophrenia, schizoaffective disorder, catatonia, and brief psychotic disorder.[4] Under the heading of brief psychotic disorder, there are specifiers associated with postpartum onset. As a primary etiology of psychosis, the schizophrenia spectrum and other psychotic disorders reflect greater potential for long-term disability due to their genomic and neurodevelopmental etiology. Schizophrenia is a diagnosis of exclusion in that all other possible (typically medical) explanations must first be ruled out.

Other psychiatric illnesses. Other psychiatric illnesses can also manifest psychotic symptoms or episodes. Disorders such as bipolar I disorder and major depressive disorder have the potential to manifest symptoms of psychosis.[4] Among the depressive disorders, psychosis is exclusively associated with the most severe expressions of clinical depression and occurs in 14% to 20% of those who are clinically depressed.[6] Psychotic episodes that manifest in the context of a depressive disorder are more commonly acute in presentation and typically have high rates of recovery with treatment. Trauma and childhood adversity may lead to a multitude of disorders (from posttraumatic stress disorder [PTSD] to personality disorders) and has also been found to increase the risk of psychosis by a odds ratio of 2.8.[7] PTSD may be associated with flashbacks and/or dissociative episodes with psychotic symptoms such as hearing voices or feeling as if one's world is no longer real.

Psychotic symptoms are not explicitly seen within personality disorders. However, personality disorders can be comorbid with a number of conditions that have the potential to manifest psychosis, such as bipolar disorders and substance use disorders. Consequently the presentation of psychosis (e.g., acute or chronic) is typically dependent on the comorbid condition and not the personality disorder.

Secondary Psychosis

Toxic psychosis. Toxic psychosis is the product of an underlying and untreated medical issue. Delirium is an example of toxic psychosis. Psychosis associated with delirium is typically rapid in onset and defined by a hallmark sign of dramatic fluctuations in mental status. Medically treating a secondary source of psychosis as one would a primary source of psychosis will not resolve the psychosis and actually increases the relative risk that the underlying medical illness will further deteriorate. Provided that the healthcare team isolates and treats the underlying medical issue, there is a reasonable expectation of complete resolution of psychosis.

Dementia. Dementia is one of many neurocognitive disorders that have potential to manifest psychosis. Dementia can be the product of multiple etiologies, including Alzheimer's disease, Lewy bodies, vascular disorders, HIV, prion disease, Parkinson's disease, traumatic brain injury, and Huntington disease.[4] A slow but progressive manifestation of psychotic symptoms within the context of a suspected neurocognitive disorder is more consistent with a dementing condition and requires specialty consultation.

Other medical conditions. Numerous medical conditions can, given the right circumstances, manifest symptoms of psychosis. Patients can manifest psychosis secondary to endocrinopathies (e.g., adrenal or thyroid disorders), metabolic disorders (e.g., porphyria and Wilson disease), nutritional and vitamin deficiencies (e.g., vitamins A, D, and B_{12}; magnesium and zinc deficiencies), central nervous system disorders (e.g., cerebrovascular accident, epilepsy, and hydrocephalus), degenerative disorders (e.g., Friedreich ataxia), autoimmune disorders (e.g., multiple sclerosis and paraneoplastic syndrome), infections (e.g., encephalitis, neurosyphilis, Lyme disease, and sarcoidosis), space-occupying lesions (e.g., congenital vascular malformations and tuberous sclerosis), and chromosomal abnormalities (e.g., Klinefelter and fragile X syndromes). When recognized, this type of secondary source of psychosis is often classified as a Psychotic Disorder Due to Another Medical Condition. Owing to the diverse etiologies, the presentation of psychosis is varied in expression but more commonly resolves in accordance with the associated illness state.

Toxins, drugs, and medications. Psychosis can also be a product of numerous toxins, drugs, and medications. This form of psychotic expression is typically most challenging to causally identify. When recognized, this secondary source of psychosis

will commonly be classified as a Substance/Medication-Induced Psychotic Disorder.[4] Possible drugs that can induce psychosis include synthetic cannabis (or Spice), synthetic cathinones (or bath salts), alcohol, cocaine, methamphetamine (or crystal meth), psychotomimetic drugs (or LSD), cannabis (or marijuana), and anabolic steroids. Likewise, certain prescribed medications also demonstrate an elevated risk for psychosis as a side effect, including sedative-hypnotic agents, amphetamines, anticholinergic agents, antiseizure agents, corticosteroids, and mefloquine. Depending on the substance used, psychosis can potentially go unrecognized and consequently be insufficiently treated. Unless the patient has a preexisting psychotic condition, psychosis that manifests within the context of a toxin or substance will typically be acute in onset with a high rate of recovery after the substance has been eliminated from the system.

Symptomatic Variations of Psychosis

The presence of psychosis suggests progressively compromised neural circuits. Psychiatric (or primary) etiologies of psychosis typically reflect epigenetically mediated compromise of the neural circuit long before symptoms eclipse the clinical threshold. Some secondary causes of psychosis (e.g., those caused by drugs, toxins, and medical illness) are not necessarily associated with a progressive compromise of the neural circuit; hence we can see variations in symptoms.

A number of symptoms can be expressed in a state of psychosis. Classic symptoms are described in Box 33.1. A conceptual or symptomatic representation of psychosis is presented in Fig. 33.2. Symptoms must be of sufficient intensity, duration, and degree of functional impairment to be recognizable as such. That point of observable recognition is defined as the *clinical threshold.*

BOX 33.1 Symptomatic Domains of Psychosis

- *Delusions:* Fixed beliefs that are not amenable to change in light of conflicting evidence
- *Hallucinations:* Perception-like experiences that occur without an external stimulus
- *Disorganized thinking:* Most commonly inferred from speech, defined by derailment, loose associations, tangentiality, and incoherence
- *Disorganized/abnormal motor behavior:* Markedly abnormal behavior ranging from agitation to catatonia that is commonly situationally incongruent
- *Negative symptoms:* Alogia, affective blunting, asociality, anhedonia, and avolition

CONSEQUENCES

Physiologic Consequences

Regardless of the underlying cause, untreated psychosis is associated with poor outcomes.[8] The physiologic consequences of psychosis are largely dependent on etiology and those variables that influence symptom duration, symptom intensity, and functional impairment.

Untreated psychosis has the potential to cause dementia; thus, a determination of consequences follows the trajectory of both the etiology and symptoms. Much as a compromised nuclear power plant cannot control its core reactor temperature, the consequence of unregulated neural circuits is the release of inflammatory markers that further degrades the circuit. For this reason, the early and decisive treatment of psychosis is critical.

Although the degradation of neural circuits is the primary consequence of psychosis, a number of secondary consequences are also worth mentioning (Table 33.1). Ironically, many of the secondary consequences are associated with treatment. Although the use of antipsychotic medications has revolutionized the treatment of psychosis, antipsychotic agents are not without risk. Long-term use of antipsychotic medications is

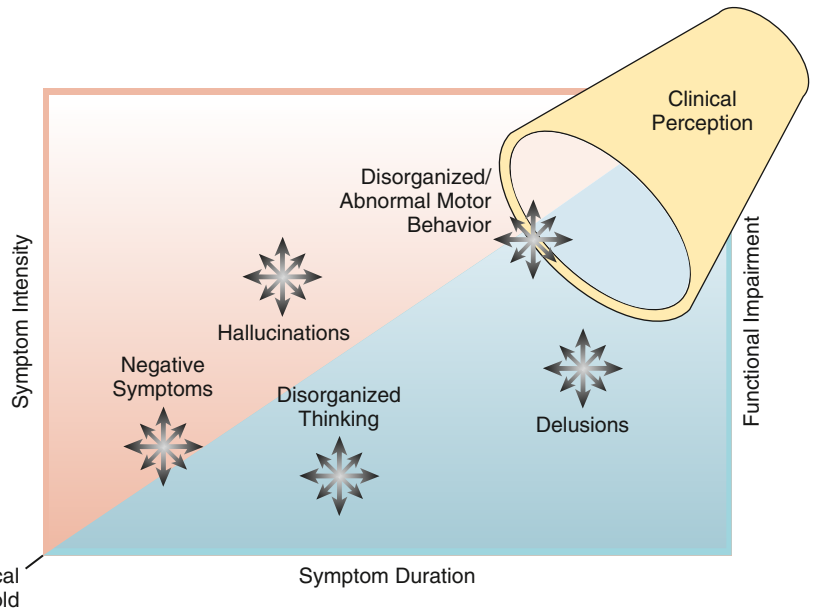

FIG. 33.2 Symptomatic Expressions of Psychosis Below and Above the Clinical Threshold.

TABLE 33.1 Secondary Consequences of Psychosis and Treatment

Pharmacotherapy Related	Behaviorally Related
• Extrapyramidal side effects	• Activity intolerance
• Hyperglycemia	• Obesity
• Dyslipidemia	• Substance use
• Hypertension	• Violence-related risk
• Hepatotoxicity	• Infectious disease exposure
• Immune compromise	• Vitamin deficiency
• Lens opacities (cataracts)	

Data from Keks, N. A., & Hope, J. (2007). Long-term management of people with psychotic disorders in the community, Australian Prescriber. *An Independent Review, 30*(2), 44–46.

associated with elevated risk of drug-induced movement disorders; metabolic syndrome; and cardiovascular, hepatic, and immune system problems.

Psychosocial Consequences

Behaviorally related consequences are influenced by both the symptomatic expression of psychosis and its treatment. Psychotic symptoms, coupled with cardiometabolic and sedating effects of many antipsychotic agents, can commonly lead to decreased activity, weight gain, and downstream disease progression of diabetes.[9] The comorbidity of psychosis and substance abuse is well documented; research indicates those with schizophrenia have an estimated lifetime prevalence of developing a comorbid alcohol use disorder to be 24.5% and 26.9% of a comorbid cannabis use disorder.[10] Also concerning, individuals with persisting psychosis typically shun and are shunned by society. This reality brings with it major implications in terms of employment, housing, and one's ability to attend to basic needs. The seriously mentally ill population may have a diminished quality of life related to homelessness, unemployment, and poverty.[11]

RISK FACTORS

There are no conclusive risk factors for psychosis in general; however, family history for psychosis, past psychotic episodes, substance use, stress intolerance, ineffective coping skills, and preexisting psychiatric illness are common variables among those who manifest psychosis. A large body of research exists on risk factors associated with schizophrenia; for this reason, the following discussion of risk factors is presented from this perspective. The determination of risk factors reflects both genetic and environmental influences.

Populations at Risk

Children with a premorbid intelligence quotient (IQ) in the learning disability range demonstrate a statistically significant risk for schizophrenia.[12] Likewise, Werner et al. determined that lower individual- and community-level socioeconomic status at the time of birth are associated with an increased risk for schizophrenia.[13]

Individual Risk Factors

Individual risk factors for psychosis exist within potentially interrelated domains of environment, genetics, and physiology.

Environment

Environmental risk factors for schizophrenia spectrum disorder appear to be clustered temporally by early life (e.g., obstetric complication, season of birth, prenatal/postnatal infection, maternal malnutrition, and maternal stress), childhood (e.g., adverse childrearing, child abuse, and head injury), and later life (e.g., drug abuse, migration/ethnicity, urbanization, social adversity, and life events).[14]

Genetic

Vulnerability to developing psychosis has been shown to be genetically linked but not defined by a single gene variant. Recent research suggests a few hundred specific genes could contribute to the risk of developing a disorder such as schizophrenia. Highly polygenic, the heritability estimate for schizophrenia is around 80%, and the monozygotic twin concordance rate is around 45%.[16] When discussing genetic correlations, it may also be pertinent to touch on gene environment interactions. For example, there are specific allele variants that have been postulated as a link to a higher risk of development of psychotic symptoms with use of cannabis, namely *COMT Val^{158}Met, DRD2, FAAH,* and *AKT1* genes, showing a genetic and environmental factor to consider.[16] One of the largest gene-environment interactions to consider is psychosocial stress and childhood adversity alongside genetic predisposition. Psychosocial stress and childhood adversity has also been linked to COMT alleles, namely *COMT Val158Met,* showing a possible link between this allele and a higher risk of developing psychosis when exposed to stress.[16] Other alleles are beginning to show links between stress, childhood adversity, and later development of psychosis such as *MTHFR-T, BDNF, CACNA1C, NRG1,* and *FKBP5*.[16]

Physiologic

In terms of potential biomarkers, some research establishes that decreased gray matter in the frontal and temporolimbic regions may be associated with schizophrenia spectrum disorders and worsening symptoms over the course of the disorder. Other associated structural changes may include a decreased hippocampus, amygdala, thalamus, and putamen alongside increased size of the lateral ventricle and pallidum.[11] There has been continued evidence pointing toward sleep deprivation as a potential inducer of psychosis, with clinical literature showing sleep as a primary factor associated with positive symptoms in schizophrenia and bipolar disorder. Distortions in sleep may also lead to psychotic symptoms in those without previously known psychopathology, with further research needed to determine amount of time/sleep needed to show full remission of psychotic symptoms and/or later development of a diagnosable mental health disorder.[17]

ASSESSMENT

Assessment for psychosis requires the systematic collection of a history, physical assessment, mental status examination, and diagnostic testing (Box 33.2). As mentioned previously, psychosis is associated with progressively compromised neural circuits; for this reason, the symptoms are progressive and evolve over

time. Many subclinical symptoms appear before the patient is overtly psychotic (see Fig. 33.2); thus, early recognition requires a critical eye. To the casual observer, individuals with subclinical symptoms of psychosis may appear odd, socially awkward, or easily distracted. The proficient or expert nurse is better able to perceive subtle signs of psychosis, such as hallucinations and negative symptoms, whereas the novice or advanced beginner is usually sensitized only to the more overt signs of psychosis, such as delusional and disorganized behavior. See Box 33.1 for common symptoms associated with psychosis. The expert nurse understands the concept of psychosis and its symptomatic expression so well that he or she is sometimes able to perceive psychosis below the clinical threshold.

History

The goal of the history is to obtain vital and time-sensitive health information that has the potential to immediately and significantly influence the trajectory of care. Cognitive impairment and diminished reality testing commonly complicate history taking with a patient experiencing psychosis. Thus, efforts to obtain collateral information from friends, family, coworkers, and past healthcare professionals are vital. A complete health history includes subjective data from the patient and (when available) a collateral source. Questions should be straightforward, concrete, and open-ended. The nurse should afford the patient with suspected psychotic symptoms additional time to answer questions. Patients with psychosis commonly experience paranoia, which makes rapport building very important.

Patients who are experiencing psychosis often lack awareness of their own medical condition or disability. This is referred to as a state of anosognosia. Consequently, using clinical terms such as *hallucination, delusion, paranoia,* and *catatonia* with a patient experiencing psychosis is contraindicated. Develop questions using nonclinical terms as part of the interview. For example, as opposed to asking, "Are you experiencing hallucinations?" ask, "Do you ever see or hear things that other people can't see or hear?" Instead of asking, "Are you delusional?" nonjudgmentally ask the patient about those beliefs that he or she feels strongly about and assess the nature of those beliefs in relation to reality. As opposed to asking, "Do you feel paranoid a lot?" ask, "Are you influenced strongly by the beliefs of others?"

BOX 33.2 Nursing Assessment of Psychosis

History
- Risk factors
- Personal medical history
- Mental health history
- Substance use
- Perinatal trauma
- Developmental history
- Family history
- Trauma exposure
- Culture and beliefs

Physical Examination
- Vital signs
- Cranial nerve assessment
- Mental status examination
  - Appearance
  - Attitude
  - Behavior
  - Mood and affect
  - Speech
  - Thought process
  - Thought content
  - Perceptions
  - Cognition
  - Insight
  - Judgment

Diagnostic Tests
- Laboratory tests
- Imaging

Physical Assessment

Physical manifestations of psychosis follow etiology. If the etiology of psychosis is medically or chemically induced, any number of physical symptoms may be present. For example, a psychotic patient under the influence of a psychoactive stimulant would also demonstrate those symptoms associated with psychoactive stimulant intoxication or withdrawal (e.g., mydriasis, bruxism, nonintentional tremor, elevated blood pressure, tachypnea, and hyperthermia). Alternatively, a psychotic patient with a comorbid history of dementia would also manifest symptoms associated with dementia (e.g., memory loss, impaired judgment, impaired abstract reasoning, impaired communication skills, and disorientation). Regardless of etiology, a mental status examination is used to assess symptoms.

Diagnostic Tests

Although there are currently no diagnostic tests that definitively rule in or out psychosis, several tests are available that can aid the nurse in differentiating between the primary and secondary etiologies of psychosis. Laboratory studies such as a complete blood count, chemistry panel (Chem18), thyroid function test, rapid plasma reagin, dexamethasone suppression test, HIV test, heavy metals panel, urinalysis, urine drug screen, urine culture and sensitivity, computed tomography, and magnetic resonance imaging can rule out a number of potential organic etiologies.

CORE COMPETENCIES

Psychosis
- Integrate evidenced-based knowledge from nursing and other sciences as it relates to psychosis.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential health problems related to psychosis.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to psychosis for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to psychosis.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to psychosis.
- Demonstrate clinical judgment founded on broad knowledge of psychosis.

CLINICAL MANAGEMENT

Clinical management of psychosis is principally dependent on etiology. If the nature of the psychosis is secondary, the health-care team must treat the underlying cause of the psychosis while simultaneously managing the symptoms of psychosis. In instances in which psychosis does not have a secondary cause, a number of treatment options are available. For the purposes of this section, clinical management focuses on the primary etiology of psychosis.

Primary Prevention

Understanding that psychosis is born of both genomic and environmental variables, primary prevention targeting the genomic influence would focus on pre-pregnancy genetic counseling. Alternatively, primary prevention targeting environmental influences requires a reconsideration of previously discussed environmental risk factors (e.g., obstetric complication, maternal health, malnutrition and stress, stable parenting, and injury prevention).

Secondary Prevention (Screening)

The focus of secondary prevention as it relates to psychosis involves screening at risk individuals (including those with a family history) and monitoring for subclinical symptoms. New scales may aid with diagnosis and evaluation of not only positive symptoms such as psychosis but also negative symptoms frequently associated with psychotic disorders. Possible evidence-based screening instruments now include Positive and Negative Syndrome Scale (PANSS), Scale for Assessment of Positive Symptoms (SAPS), The Scale for Assessment of Negative Symptoms (SANS), Clinical Assessment Interview for Negative Symptoms (CAINS), Brief Negative Symptom Scale (BNSS), Negative Symptoms Assessment-4 (NSA-4), and Clinical Global Impression-Schizophrenia (CGI-SCH).[18]

Available evidence indicates that early intervention within the prodromal phase (the period in which subtle symptoms of psychosis begin to rise to the level of clinical significance) is associated with the best possible outcome. In that regard, the proficient or expert nurse who is able to discern symptoms at or below the clinical threshold is in a particularly unique position to positively influence the trajectory of care.

Collaborative Interventions

The clinical management of psychosis is subdivided into four classifications: pharmacologic (Box 33.3), nonpharmacologic, lifestyle modification, and community integration. Although nearly half of those with schizophrenia spectrum disorder do not receive care, those who do typically do not receive comprehensive care.

Pharmacotherapy

First-generation antipsychotics. Most first-generation antipsychotics are no longer considered first-tier choices for the treatment of psychosis; however, they are still seen in community-based and forensic settings throughout the country. First-generation antipsychotics (see Box 33.3) reduce the transmission of dopamine at the D_2 receptor site of four key dopaminergic pathways in the brain. Their ability to target the positive symptoms associated with schizophrenia spectrum disorder is well established. Regrettably, they are not as effective with negative symptoms. Additionally, they are also known for significant side effects—including anticholinergic high-risk extrapyramidal side effects (EPSs), sedation, and weight gain—that have historically led to medication adherence problems.

Second-generation antipsychotics. Second-generation antipsychotic agents (see Box 33.3) also target positive symptoms of psychosis with their D_2 antagonism; in addition, they target negative symptoms with their 5-HT_{2a} antagonism and (for certain agents) 5-HT_{1a} agonism.[5] Their tendency to more loosely bind to targeted receptor sites results in a lower risk for EPSs. Although the second-generation antipsychotics are considered first-line choices for the treatment of psychosis and have a lower risk for EPSs, they have a markedly increased risk for metabolic disorders such as dyslipidemia, diabetes, and weight gain if used for long periods of time.

BOX 33.3 Pharmacologic Agents for the Treatment of Psychosis

First-Generation Antipsychotics
- Haloperidol (Haldol)
- Fluphenazine (Prolixin)
- Thiothixene (Navane)
- Trifluoperazine (Stelazine)
- Perphenazine (Trilafon)
- Chlorpromazine (Thorazine)
- Thioridazine (Mellaril)
- Loxapine (Loxitane)

First-Generation Antipsychotic Long-Acting Injectables
- Haloperidol decanoate (Haldol Decanoate)
- Fluphenazine (Prolixin)

Second-Generation Antipsychotics
- Clozapine (Clozaril)
- Olanzapine (Zyprexa)
- Risperidone (Risperdal)
- Quetiapine (Seroquel)
- Aripiprazole (Abilify)
- Paliperidone (Invega)
- Ziprasidone (Geodon)
- Asenapine (Saphris)
- Iloperidone (Fanapt)
- Paliperidone (Invega)
- Lurasidone (Latuda)
- Pimavanserin (Nuplazid)
- Brexpiprazole (Rexulti)
- Cariprazine (Vraylar)

Second-Generation Antipsychotic Long-Acting Injectables
- Aripiprazole lauroxil (Aristida)
- Aripiprazole (Abilify Maintena)
- Paliperidone palmitate (Invega Sustenna)
- Paliperidone palmitate (Invega Trinza)
- Paliperidone palmitate (Invega Hafyera)
- Risperidone (Risperdal Consta)
- Olanzapine (Zyprexa Relprevv)
- Olanzapine (Zyprexa Zydis)

Long-Acting Injectables Used Outside of the U.S.
- Flupentixol decanoate
- Pipotiazine palmitate
- Zuclopenthixol decanoate

Anticholinergic Agents
- Benzotropine (Cogentin)
- Bromocriptine (Parlodel)
- Trihexyphenidyl (Artane)
- Diphenhydramine (Benadryl)

Tardive Dyskinesia Agents
- Deutetrabenazine (Austedo)
- Valbenazine (Ingrezza)
- Tetrabenazine (Xenazine)

Anticholinergic agents. Anticholinergic agents (see Box 33.3) are used to treat EPSs resulting from the use of antipsychotic medication. EPSs can occur because of excessive D_2 binding within the nigrostriatal pathway. Because certain forms of EPSs are considered medical emergencies (e.g., acute pharyngeal dystonia) and potentially permanent (e.g., tardive dyskinesia), anticholinergic agents can be delivered orally, intramuscularly, or intravenously to target EPSs.

Tardive Dyskinesia agents. Tardive Dyskinesia (TD) is a side effect, part of the EPS grouping, that comes from antipsychotic use thought to be otherwise untreatable. Tardive dyskinesia is involuntary hyperkinetic movement induced by chronic blockade and subsequent upregulation of D_2 receptors.[19] With new pharmacologic agents, there is hope to aid with treating TD in patients whose symptoms have become permanent and/or cannot decrease their dose of their antipsychotic or switch to another agent for risk of destabilization. Vesicular monoamine transporter type 2 inhibitors (VMAT2 inhibitors) are the mainline pharmacologic therapy now available to treat TD.[19] The three utilized VMAT2 inhibitors (Box 33.3) include Valbenazine, Deutetrabenazine, and Tetrabenazine, although Tetrabenazine is primarily utilized to treat Huntington's disease as opposed to TD linked to antipsychotic use.[19] Common side effects of VMAT2 inhibitors found include fatigue and somnolence.[19]

Long-acting injectables. Medication consistency for many with psychosis may become a barrier to effective treatment. Long-acting injectable (LAIs) agents (Box 33.3) may help mitigate this barrier. LAIs include both first- and second-generation antipsychotics. First-generation antipsychotic LAIs, such as fluphenazine and haloperidol, target primarily dopamine blockade while second generation antipsychotic LAIs such as aripiprazole and paliperidone target both dopamine and serotonin blockade.[20] Deciding to utilize a first- or second-generation LAI primarily depends on a patient's response with past oral medications, usually leading to transitioning to an LAI from the oral medication that they were on. But clinicians may also consider cost and availability when making this decision.[20] LAIs have generally been reserved for patients who have shown efficacy with oral antipsychotics for a period of time and/or have a history of frequent hospitalizations/destabilization. This may continue to be questioned and new practices may be established in which patients who experience their first episode of psychosis may be placed on LAIs to aid with preventing relapse, destabilization, and aiding with medication consistency.

Nonpharmacologic Therapies

Social skills training. Psychosis, by its very definition, has the potential to slowly and progressively dissolve interpersonal relational skills. The acquisition and maintenance of social skills can be seen as a bridge to long-term symptom management. Social skills training (SST) may aid individuals with psychosis to improve their social performance, interaction, and interpersonal skills. SST may include a multitude of approaches, such as including principles of cognitive-behavioral therapy, but is generally done in a group format.[21]

Family-focused therapy. Tailored to families influenced by schizophrenia spectrum disorder, family-focused therapy (FFT) educates the family on the nature of psychosis, its symptoms, and common management strategies. Research has established that FFT improves medication adherence, reduces the rate of relapse, and reduces psychiatric readmission rates.[22-24]

Cognitive-behavioral therapy for psychosis. Cognitive-behavioral therapy is premised on the notion that how one perceives and interprets sensory stimuli has a direct bearing on the reaction one has to that situation. Upon initial consideration, this form of therapy would seem contraindicated for an individual struggling with psychosis. It is important to note that an individual with schizophrenia spectrum disorder is not perpetually psychotic and can go months or even years without psychotic symptoms. Evidence suggests that cognitive-behavioral therapy for individuals with a history of schizophrenia who are not currently experiencing psychosis can improve medication adherence, insight, and social functioning.[25]

Cognitive enhancement therapy. Cognitive Enhancement Therapy (CET) is a modality intended for those with schizophrenia currently stabilized, in their recovery phase. CET targets both neurocognition and social cognition. Computer-based exercises are utilized to aid with attention, memory, and problem-solving abilities, while group therapy targets social cognition; sessions focus on learning social skills such as understanding social context and appraisal, recognizing emotional cues, and gaining further perspective. Individuals can practice the skills they learn through homework, cognitive exercises, and unrehearsed social situations. CET has been shown to aid with both employment of those with schizophrenia[26] as well as the treatment of negative symptoms.[27]

Electroconvulsive therapy. Electroconvulsive therapy (ECT) is a treatment modality that involves electrical stimulation of the brain to induce a seizure while a patient is under anesthesia.[28] ECT has primarily been utilized for severe depression and is FDA indicated for the treatment of catatonia and depression. ECT may also provide further aid for treatment of psychotic depression, positive psychosis symptoms, and mania alongside depression and catatonia but comes with the risk of cognitive and memory side effects.[29] Depending on the severity of symptoms, 6 to 12 rounds of ECT commonly demonstrate improvement in target symptoms with the potential for longitudinal maintenance sessions thereafter.

Lifestyle Modification

Lifestyle modification addresses behaviors that have the potential to either improve or worsen one's condition. Most second-generation antipsychotics pose an increased risk for weight gain, dyslipidemia, development of type 2 diabetes, and overall increased risk of cardiovascular disease.[30] For this reason, lifestyle modification approaches are a critical element in the long-term management of psychotic disorders.

Serial health monitoring. Second-generation antipsychotic agents have greatly improved the management of positive and negative symptoms. Research suggests that a second-generation antipsychotic metabolic monitoring process that serially assesses abdominal obesity, triglycerides, high-density lipoprotein cholesterol, blood pressure, and fasting glucose has the potential to mitigate some degree of the risk associated with the long-term use of these agents.[31]

Case management. Case management employs a team of healthcare workers to serve as a liaison between the patient and the community to maximize patient autonomy without compromising patient health and well-being. Assertive community treatment (ACT) is a popular model that uses a team consisting of a case manager, primary care provider, mental health provider, and nurse and in which care is decentralized away from the traditional brick-and-mortar environment and accessible 24 hours a day. ACT has proven to be both clinically and fiscally efficacious.[32-34]

Vocational therapy. Vocational therapy is a process that individualizes resources for those with functional, psychological, developmental, or cognitive impairments; it is intended to overcome barriers to accessing, maintaining, or returning to employment. In individuals with a schizophrenia spectrum disorder, vocational therapy has been shown to improve cognitive and negative symptoms,[35] clinical outcomes,[36] and social functioning.[37]

INTERRELATED CONCEPTS

Multiple concepts are clearly interrelated to the concept of psychosis (Fig. 33.3). Incorporating several key psychosocial concepts and professional nursing concepts is essential to improving health outcomes when caring for psychotic patients. **Person-Centered Care** represents the foundation of care for individuals with mental health conditions, including Psychosis. With this approach, the patient and family members are partners with the healthcare team regarding the planning and implementation of care. **Communication** is a key concept because this represents an important skill needed to establish therapeutic relationships with psychotic patients. The concept of **Patient Education** is linked to the instructional treatment of protocols, disease processes, and pharmacologic interventions. **Collaboration** is essential for effective treatment and includes the interprofessional team to optimize specialty-related patient outcomes. These three concepts (Communication, Patient Education, and Collaboration) are also key elements within the Person-Centered Care approach.

Health Policy is important in the context of regulations that oversee the delivery of mental health care in the United States. The concepts of **Ethics** and **Health Care Law** relate to ensuring appropriate use of restrictive treatment interventions (i.e., seclusion, sedation, and restraints). In terms of psychiatric commitment, the legal concepts of habeas corpus and justification for involuntary treatment must be respected.

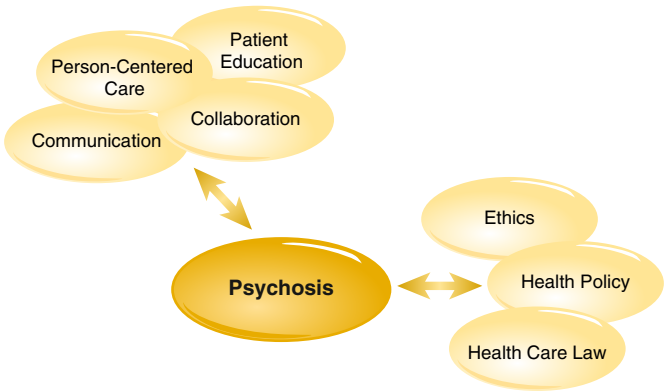

FIG. 33.3 Psychosis and Interrelated Concepts.

CLINICAL EXEMPLARS

As already established, psychosis can manifest from multiple etiologies. Box 33.4 presents common exemplars associated with psychosis. A comprehensive description and explanation of each exemplar is beyond the scope of this text; here, however, some of the most common exemplars are featured, with a short description. The psychiatric/mental health references offer more detailed information about each of these conditions.

Featured Exemplars

Schizophrenia

Schizophrenia is a severe mental illness defined by a constellation of positive symptoms (e.g., hallucinations, delusions, disorganized speech and behavior, catatonia, and agitation), which commonly distance society from the patient; it also comprises negative symptoms (e.g., alogia, affective blunting, asociality,

BOX 33.4 EXEMPLARS OF PSYCHOSIS

Schizophrenia Spectrum and Other Psychotic Disorders
- Schizotypal personality disorder
- Delusional disorder
- Brief psychotic disorder
- Schizophreniform disorder
- Schizophrenia
- Schizoaffective disorder
- Substance/medication-induced psychotic disorder
- Psychotic disorder due to a general medical condition
- Catatonia associated with another mental condition
- Catatonic disorder due to another medical condition
- Unspecified catatonia
- Other specified schizophrenia spectrum disorder and other psychotic disorder
- Unspecified schizophrenia spectrum and other psychotic disorder

Bipolar and Related Disorders
- Bipolar I disorder with psychotic features
- Substance/medication-induced bipolar and related disorder
- Bipolar and related disorder due to another medical condition

Depressive Disorders
- Major depressive disorder with psychotic features
- Substance/medication-induced depressive disorder
- Depressive disorder due to another medical condition

Substance-Induced Disorders
- Substance intoxication and withdrawal

Neurocognitive Disorders
- Delirium
- Major neurocognitive disorder
- Substance/medication-induced major neurocognitive disorder

Personality Disorders

Cluster A personality disorders

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anhedonia, and avolition) that frequently distance the patient from society. Schizophrenia commonly manifests insidiously between late adolescence and early adulthood with a prodromal phase and requires lifelong management to control psychotic episodes. In addition to psychotherapy, treatment typically involves the use of antipsychotic agents.

Major Depressive Disorder, Severe With Psychotic Features

Major Depressive Disorder, Severe With Psychotic Features is defined by a primary constellation of major depressive symptoms with a symptomatic overlay of psychotic features. Psychosis seen within the context of this condition is episodic in nature but nonetheless a poor prognostic indicator. In addition to psychotherapy, treatment for a severe major depressive disorder with psychotic features requires antidepressant and antipsychotic agents to control target symptoms.

Delirium

Delirium is defined by rapid changes in brain function and cognitive capacity that occur within the context of a co-occurring physical condition. Symptoms can manifest as disturbance in attention, cognition, and behavior.[4] Consequently psychosis or psychotic behavior can result from a delirium state. A cardinal symptom of delirium is defined by a waxing and waning of mental status. Delirium is considered a medical emergency. Common sources of delirium can be substance withdrawal, severe electrolyte abnormality, systemic infection, poor nutrition or dehydration, multiple co-occurring medical problems, and polypharmacy. Treatment follows the underlying etiology of the delirium state.

Major Neurocognitive Disorder

Major neurocognitive disorder is defined by a demonstrable cognitive decline from a previous level of performance as seen within different cognitive domains.[4] Consequently psychosis or psychotic behavior can also result from a progressing neurocognitive disorder. The onset of symptoms with a major neurocognitive disorder is slow and progressive and not defined by the waxing and waning of mental status. Most etiologies of a major neurocognitive disorder are not typically reversible but can be slowed with different forms of pharmacotherapy and rehabilitation.

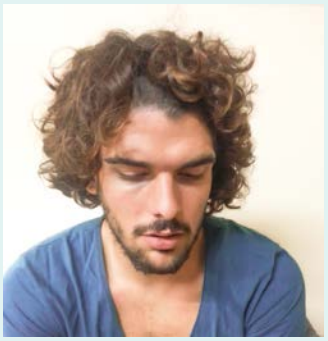
Substance/Medication-Induced Psychotic Disorder

Substance/medication-induced psychotic disorder is a time-limited manifestation of psychotic symptoms triggered by the ingestion of a substance or medication known to promote psychosis. Psychotic symptoms typically have a rapid onset with no evidence of prodrome and commonly dissipate after the substance has sufficiently degraded within the body.

Brief Psychotic Disorder with Postpartum Onset

Brief psychotic disorder with postpartum onset is rare (0.890 to 2.6 in 1000 women).[38] However, when it presents, it commonly does so within the first month following childbirth and can manifest with both positive and negative symptoms. Although medically treated, as in the case of any other expression of psychosis, confounding variables are associated with the potential risks associated with breastfeeding while on antipsychotic medications as well as impaired mother-child bonding. Postpartum psychosis may be a manifestation of either a bourgeoning schizophrenia spectrum or bipolar spectrum disorder activated by the marked hormonal shifts associated with pregnancy.[39]

CASE STUDY



Case Presentation

Addo, a 28-year-old man, is employed part-time as a stock clerk at a local grocery store and lives in an adult family home. Addo was readmitted to the state hospital after a serious suicidal gesture in which he utilized a kitchen knife found in the home to cut his leg. Prior to this most recent admission, his established diagnosis was *schizophrenia, first episode, currently in partial remission,* and *nicotine dependence.* Addo's family history is unknown, as he spent the majority of his life in and out of foster care; he spent many years displaced between homes due to reported aggressive behavior. Addo had prior hospitalizations as a child for this reported aggressive behavior but would always act respectfully to hospital staff when awaiting new foster home placement. It was found later that Addo endured sexual and physical abuse in his foster homes intermittently from the ages of 5 to 13.

Addo's first break of psychosis occurred at age 18 years, around 6 months after he aged out of his last foster home. His prodromal period was more prominent for negative symptoms (e.g., alogia, affective blunting, asociality, anhedonia, and avolition), with positive symptoms (e.g., audiovisual hallucinations, paranoia, and disorganized speech and behavior) surfacing much later and remitting much more quickly with treatment. Addo was initially prescribed risperidone and achieved remission of all positive symptoms apart from some continued auditory hallucinations and some portion of his negative symptoms after 6 months of treatment, with two hospitalizations and an eventual transition to a long-acting injectable form of risperidone (Risperdal Consta). A review of his outpatient record indicates that his negative symptoms have oscillated around the clinical threshold during the past 3 years, and he has been struggling with suicidal thoughts for the better part of the past 6 months. The persistent nature of his depressive symptoms prompts a diagnostic reconsideration of *schizoaffective disorder, multiple episodes, depressive type.*

During this most recent hospitalization, Addo's positive symptoms again quickly resolved, but his negative symptoms persisted, prompting the decision to add an antidepressant (Prozac) to his medication plan. Upon stabilization, he was transferred to a new adult family home that focused on care for adults with psychiatric conditions, where cognitive enhancement therapy, art therapy, nutritional counseling, case management, and vocational rehabilitation were provided. With this augmented plan of care, Addo was able to get remarkably better control of his negative symptoms and has now returned to working at the grocery store, but in the baking department where he can showcase his artistic talents, and he is considering reenrolling in a local community college to focus on an art degree.

Case Analysis Questions

1. What risk factors are evident in Addo's case that might be contributing to Addo's condition?
2. Which clinical findings in Addo's case are consistent with psychosis?
3. What are the potential benefits of cognitive enhancement therapy for Addo?
4. What steps could have been taken/implemented to improve Addo's care earlier in his life?

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CONCEPT 34

Substance Misuse and Addiction

Richard A. Pessagno

The financial cost of substance misuse and addiction is staggering. It is estimated that, in the United States, the costs associated with substance use disorders are over $760 billion annually;[1] this significant financial loss does not account for the stress, grief, and suffering endured by families and friends as a result of addiction. The purpose of this concept presentation is to develop a generalist nurse conceptual paradigm for the recognition and assessment of substance misuse and addiction on individual, family, and community levels. A conceptual understanding of this concept will enable nurses to analyze patient data for the planning and implementation of interventions that ensure patient safety during emergency management and to motivate patients toward successful recovery from addiction during nonemergency management.

DEFINITION

Terminology related to the concept of substance misuse and addiction is controversial and subject to debate. For the purpose of this concept presentation, the term addiction is defined as

> *"a compulsive, abnormal dependence on a substance (such as alcohol, cocaine, opiates, or tobacco) or on a behavior (such as gambling, Internet, or pornography). The dependence typically has adverse psychological, physical, economic, social, or legal ramifications."*[2]

The American Psychiatric Association (APA) defines a wide range of mental disorders in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5); the terms *substance-induced disorders* and *substance use disorders* are used as diagnostic categories.[3] Substance-induced disorders involve the direct effects of the substance, and substance use disorders include cognitive, behavioral, and physiologic symptoms associated with long-term use.[4] These distinctions are clarified further in the sections that follow. The term *intoxication* is used to describe behavioral and/or physical symptoms that result from substance use. *Craving* in the context of this concept is used to describe a desire to use a substance and is a symptom associated with substance use disorder. *Tolerance,* another symptom indicating substance use disorder, is defined as an increasing need for the substance to achieve its reward. A lack of reward from the same dose as previously taken would also be considered tolerance. *Withdrawal* refers to a syndrome of symptoms that occurs from a sudden cessation of taking the substance.[3]

SCOPE

This concept presentation examines addiction from the perspective of two broad categories—substance addictions and behavioral addictions (Fig. 34.1). There is some controversy regarding whether behavioral addictions exist, but as new developments occur in understanding brain neurochemistry, it is becoming more evident that substance addictions and behavioral addictions are the result of similar neurochemical processes.[4]

NORMAL PHYSIOLOGICAL PROCESS

Unlike most concepts presented in this book, the concept of addiction does not have a "normal" physiological process because addiction is never considered normal. However, there is an expected physiological process associated with addiction. Discussions of addiction physiology focus either on the exogenous signs and symptoms of substance misuse (see Box 34.1) or on the endogenous neurochemistry that underlies these signs and symptoms. The neurochemical relationship between addictive behaviors or substances and neurotransmitters in the brain is complex; models are being explored on the frontiers of addiction science.[4]

It is believed that neurochemical interactions related to addiction originate in the caudate nucleus, the nucleus accumbens, and the ventral tegmental areas of the brain—otherwise known as the reward centers. The reward centers are

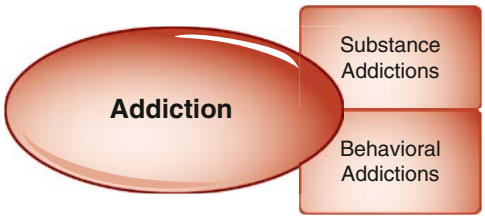

Fig. 34.1 Scope of Concept: Addiction.

BOX 34.1 Symptoms and Behaviors of Addiction

- Fatigue
- Insomnia
- Headaches
- Seizure disorder
- Changes in mood
- Anorexia, weight loss
- Vague physical complaints
- Overabundant use of mouthwash or toiletries
- Appearing older than stated age, unkempt appearance
- Leisure activities that involve alcohol and/or other drugs
- Sexual dysfunction, decreased libido, erectile dysfunction
- Trauma secondary to falls, auto accidents, fights, or burns
- Driving while intoxicated (more than one citation suggests dependence)
- Failure of standard doses of sedatives to have a therapeutic effect
- Financial problems, including those related to spending for substances
- Frequent reference to alcohol or alcohol use indicating preoccupation with and importance of alcohol in the person's life
- Problems in areas of life function (e.g., frequent job changes; marital conflict, separation, and/or divorce; work-related accidents, tardiness, absenteeism; legal problems, including arrest; social isolation; and estrangement from friends and/or family)

Modified from Lewis, S. L., Dirksen, S. R., Heitkemper, M. M. et al. (2014). *Medical–surgical nursing: Assessment and management of clinical problems* (9th ed.). St Louis: Mosby.

affected in different ways depending on which neurotransmitters and other brain areas are involved. It is evident that the neurotransmitter dopamine plays a key role in many or all addictive processes, whether addictions are chemical[5] or behavioral.[4] Dopamine is directly associated with the euphoric reward known as being "high," and other neurotransmitters are associated with dopamine regulation. Other neurotransmitters identified as being involved in reward pathways include endogenous opioids, γ-aminobutyric acid, glutamate, acetylcholine, norepinephrine, and serotonin.

VARIATIONS AND CONTEXT

As mentioned previously, the scope of this concept is represented by two broad categories: substance addictions and behavioral addictions.

Substance Addictions

There are two major categories of problems stemming from substance addictions: substance-induced disorders and substance use disorders.

Substance-Induced Disorders

Substance-induced disorders are typically temporary and reversible, caused by the immediate use of a substance and the immediate effect that occurs when the substance use is discontinued. The substance affects the central nervous system, causing physiological, psychological, and/or behavioral effects; the symptoms of intoxication or withdrawal are related to the specific substance or substances used. Thus, these disorders can include not only intoxication/withdrawal but also other conditions associated with intoxication and withdrawal, such as depression, anxiety, or psychosis.[5]

Substance Use Disorders

Substance use disorders result from continued, frequent use of a substance; the consequences occur over time as a cumulative effect as the addiction progresses. Substance use disorder combines misuse and dependence into a single diagnostic category with mild, moderate, and severe subclassifications. Although each substance has its own related disorder (i.e., alcohol use disorder, heroin use disorder, opioid use disorder, etc.), the same overarching criteria for diagnostic purposes are used. According to the DSM-5, meeting 2 of 11 criteria within a 12-month period is indicative of substance use disorder. Severity is based on the number of criteria met (two for mild, four for moderate, and six or more for severe).[3]

Behavioral Addictions

Although less clearly defined, there are many examples of behavioral addictions found in the literature. Like substance addictions, there are several behaviors that produce a reward response similar to the neurochemical processes previously described. An alternative perspective is that behavioral addictions actually represent impulse control disorders. This perspective has given rise to significant debate regarding the legitimacy of formally recognizing behavioral addictions. Although only one behavioral addiction (gambling disorder) was included in the DSM-5 diagnostic criteria,[3] a less restrictive view is used for this concept presentation. Other behavioral addictions found in the literature (e.g., Internet addiction, gaming addiction, food addiction, and sex addiction) are included.

CONSEQUENCES

Depending on the individual and the particular addiction, the consequences of addiction are highly variable. However, an understanding of the neurochemical processes known as *habituation* and *adaptation* forms a conceptual foundation for understanding all addictions. Habituation begins when neurons that receive a repetitive stimulus chemically inhibit their own receptors to restrict the stimulus. Habituation permits the organism to tolerate primal suffering such as hunger pain during a famine, but habituation also facilitates higher order functioning. For example, as a result of habituation, city dwellers are able to sleep in the presence of city sounds such as traffic noise or sirens.

If a repetitive stimulus persists, the neurons will permanently restrict a sufficient number of their own receptors to permit functioning of the organism in the presence of the stimulus; this is called *adaptation.* In evolutionary terms, adaptation began as a survival mechanism allowing the organism to establish a new equilibrium in the presence of an unceasing, long-term stimulus. Once adaptation to a repetitive stimulus occurs, the level of stimulus must be increased to overcome the adaptation for there to be perception of the same stimulus. A user of cocaine

who has adapted to a particular dose, for example, will no longer perceive a high on the same dose; therefore, the dose of cocaine must be increased to get high. In turn, the brain neurochemically adapts to the increasing doses of cocaine in an addictive cycle known as *tolerance*. That is, habituation and adaptation cause tolerance.

Any behavioral reward, such as pleasure, is in fact a neurochemical process mediated by neurotransmitters; therefore, the brain will habituate and adapt neurochemically to repetitive behaviors such as gambling in the same way as it will adapt to ingested substances such as cocaine. Gamblers have to gamble more often for higher stakes to overcome the brain's adaptation to the gambling high. All the neurochemical consequences of substance use—whether alcohol, tobacco, cocaine, amphetamines, opiates, or others—apply to nonsubstance addictions such as money, power, relationships, sex, pornography, food, gambling, computer games, television, work, exercise, sports, and even addictive thought patterns such as worry or rumination.[5]

The processes of habituation, adaptation, tolerance, and withdrawal are well illustrated by an example in which an individual is too anxious to sleep. The anxiety triggers the release of adrenaline as part of the fight-or-flight response, and insomnia results from the adrenaline. The brain recognizes the importance of sleep and will eventually block the anxiety stimulus so that sleep will occur. Some motor vehicle drivers have experienced this mechanism—the brain chemically overwhelms the alertness necessary to stay awake and accidents occur when drivers fall asleep at the wheel.

Tolerance and withdrawal enter the picture if a sedative is taken to artificially overwhelm the stimulus of anxiety to achieve sleep. In this case instead of blocking the anxiety stimulus, the brain will block the sedative by signaling the release of more adrenaline. Tolerance occurs when increasing doses of the sedative is needed to overcome the increasing level of adrenaline. If the sedative is abruptly discontinued, the brain does not immediately stop signaling the release of adrenaline, and, therefore, the opposite effect of the sedative occurs in the form of restlessness and insomnia even if the original stimulus for anxiety is resolved. This restlessness and insomnia are called the rebound effects of withdrawing the sedative. After one or two nights, neurons will readjust, and these rebound effects will cease, but if the sedative is continued to artificially counter the rebound effects, then adaptation will take place, and there will be addiction to the sedative.

RISK FACTORS

Predisposing risk factors associated with addiction include family history of addiction, burnout, mood disorders, and stress.[5] Homelessness is also a significant risk factor for addiction.[6] Other risk factors identified include early aggressive behavior, lack of parental supervision, drug availability, and poverty.[7] Individuals with previous histories of dependence on opiates are at much higher risk for becoming addicted to opioid analgesics.[8] Use of illicit drugs, tobacco, and alcohol is much higher among adults with co-occurring severe psychological distress.[9] The unique challenges faced by those with cooccurring disorders are discussed in the *Clinical Management* section of this concept presentation.

Prevalence

Alcohol and tobacco use are the most common substances used, whereas cannabis and misuse of prescription pain medication are the most prevalent illicit substances used in the United States.[9] Over 23 million Americans aged 12 years and older have substance use disorders; approximately 10% receive treatment.[9] The misuse of prescription medication continues to rise and is most prevalent among those who misuse opioid prescription medication. Misuse of prescription medication is understood to be the use of medication other than what has been directed by the prescribing provider or the use of a prescription written for another individual.[9] There is scant literature that addresses the prevalence of behavioral addictions, so the prevalence is typically not well established; however, the more commonly recognized behavioral addictions are gambling, shopping, Internet use, video games, exercise, food addictions, and several subtypes of sex addiction.[9]

Substance Misuse Among Nurses

Substance use among healthcare professionals has been a long-standing concern for all health professions. It is estimated that almost 6% of nurses have a history of substance misuse.[10] Misuse of prescription drugs, alcohol, and cannabis were markedly higher among nurses as a result of the COVID-19 pandemic; subsequently, regulatory agencies across the country have seen an increase in substance issues among nurses.[10]

Identifying risk factors for substance misuse among nurses is key if early intervention and prevention are to be achieved. Risk factors specific for nurses include job-related stress and having access to controlled medication. Many nurses experience guilt and shame around their substance use; they often feel that have let patients and colleagues down or may be afraid of how colleagues will view them.[10]

ASSESSMENT

The first priority of nursing assessment for persons experiencing addictions is identifying those in need of emergency management so they can be referred immediately for stabilization. Nonemergency priorities of the assessment are aimed at identifying possible addictions by interview and screening so that treatment options for recovery can be explored. Screening tools are used during the history and examination; these are discussed under Secondary Prevention in the *Clinical Management* section.

History

There are a number of general symptoms an individual with substance use or induced disorders may mention when taking a patient history (see Box 34.1). The patient history can also include exploring the use of prescription and over-the-counter drugs, herbal and homeopathic products, caffeine, tobacco

products, alcohol, and recreational drugs. The patient may consider the disclosure of addictions to be risky, so it is important to reassure the patient that the information is confidential. Even so, because those who have substance addictions tend to be deceptive about substance use, patients are unlikely to disclose addictions accurately.[5] For this reason, it is recommended that the nurse build trust and rapport by using a therapeutic communication technique called motivational interviewing.

The use of motivational interviewing is discussed further in the *Clinical Management* section of this chapter because it has been demonstrated that motivational interviewing can improve recovery significantly.[12] However, it is also recommended that the nurse use motivational interviewing methods during assessment to identify these defining characteristics for addiction: (1) tolerance and withdrawal, (2) deception of the self and others, and (3) relapse processes (loss of willpower). This interview technique allows the nurse to explore the defining characteristics as they arise without loss of rapport. A discussion of the defining characteristics of addiction is provided to facilitate the assessment.

Tolerance and Withdrawal

Tolerance and withdrawal are the result of the neurochemical processes already discussed: habituation and adaptation. The nurse can identify tolerance when the patient acknowledges the need for increasingly more of the stimulus to achieve reward. Withdrawal symptoms occur when sufficient quantities are not obtained to achieve reward because of tolerance or because of reducing consumption. There are two categories of withdrawal symptoms: the stress reaction symptoms and the rebound symptoms. Stress reaction symptoms are mediated by the autonomic nervous system and result from the stress of stopping the addictive behavior. Stress reaction symptoms range from mild uneasiness and irritability to extreme agitation, rapid pulse rate, tremors, and panic.

Rebound symptoms occur when adaptive changes in the brain that counter the effects of the addiction continue despite cessation of the addictive substance or behavior; therefore, the effects of the rebound symptoms are the exact opposite of the effects of the addiction. If the addiction is stimulating, then rebound symptoms can be sedating and manifest as lethargy. If the addiction is sedating, then the rebound symptoms can manifest as agitation. This explains why stimulant addicts experience a "crashing" of mood and energy as a rebound symptom but also have anxiety as a stress reaction symptom. Agitation will be a rebound symptom to stopping the use of substances that are sedating, such as alcohol or benzodiazepines, and the agitation may be compounded as a reaction to the stress of stopping the substance.

Deception of the Self and Others (Denial)

Deception of the self and others may be loosely referred to as denial. Sometimes addicts deliberately deceive others to hide their addiction, but they may also deceive themselves. Individuals with substance use disorders may be dishonest, covert, engage in criminal activity, and/or turn away from family and friends in order to maintain their substance use. These individuals may find themselves engaging in activities (such as exchanging sex for drugs or robbery) that they would have never otherwise considered doing in order to maintain their substance use. Deception underlies tension, stress, and betrayal that is experienced among family and friends of individuals who have substance use disorders.

Relapse

Relapse processes are invariably linked to addiction, and they are addressed in the *Clinical Management* section because they are directly related to recovery.

Physical Examination

A routine physical exam may disclose evidence of addiction. Long-term use of toxic substances may harm the liver and result in symptoms of liver failure such as jaundice, fatigue, abdominal discomfort, or ascites. Intravenous drug users may have damaged veins and be at risk for coronary complications that include endocarditis. Opiates and stimulants reduce appetite, so users of these substances tend to develop an undernourished, emaciated appearance. Physical signs typical of a withdrawal stress reaction should be noted, such as anxiety, palpitations, shakiness, muscle pain, goose bumping, nausea, vomiting, increased heart rate, and diaphoresis. Other physical exam findings are listed in Box 34.1.

Diagnostic Tests

Diagnostic tests detect the presence of drug and alcohol metabolites in the blood and urine. Tests may also be ordered to detect addiction-related disorders, such as hepatitis, liver disease, and smoking-related disease.

CORE COMPETENCIES

Addiction

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to addiction and substance use disorders.
- Using a person-centered approach, perform a clinically relevant assessment, recognizing actual or potential problems involving substance misuse and addiction.
- Collaborate with the interprofessional team to establish mutual healthcare goals related to addiction for individuals, communities, or populations.
- Using a person-centered approach, implement interventions and evaluate the plan of care to address individual patient, family, or community needs related to addiction.
- Demonstrate clinical judgment founded on broad knowledge of addiction.

CLINICAL MANAGEMENT

Primary Prevention

To prevent addiction, nurses need to understand the individual and social contexts in which addiction occurs. This section examines primary prevention from the community perspective and from the individual perspective.

Community Health

Programs that address the prevention of substance misuse lead to healthier communities,[13] and programs that use community assets are best able to fully engage the communities. Community

engagement has been shown to be a foundational element to improve the overall health and recovery of their communities relative to substance misuse.[13] Building on existing community resources and identifying and developing new resources enhance the success rate of communities meeting their goals for both short-term and long-term recovery.[13]

Individual Positive Coping Strategies

Positive coping strategies are nonspecific and highly individualized to an individual's past experiences and specific situation. Ideally, positive coping strategies are used instead of turning to drugs or alcohol to cope. Coping strategies are consistent with general health promotion strategies that optimize wellness, including maintaining good health, proper nutrition, and exercise. Additionally, maintaining positive personal relationships, positive social support networks, and positive self-esteem underlie positive coping strategies.

For nurses and other healthcare providers, personal coping strategies include developing a self-care philosophy that includes setting limits at work by saying "no" to unreasonable expectations; debriefing stress through supportive professional relationships; and developing rituals for coping with loss, grief, and death. It is recommended that all nurses reflect upon and further explore ideas for the positive management of stress so that they can experience long and rewarding careers free from substance use.

Secondary Prevention (Screening)

The U.S. Preventive Services Task Force recommends screening all individuals older than age 13 years for alcohol misuse.[14] As front-line workers, nurses and other healthcare providers can use screening tools such as the CAGE and AUDIT questionnaires to raise awareness, educate, and promote healthy life style choice relative to substance use.[14] Box 34.2 presents these instruments with recommendations for their use by nurses. The CAGE questionnaire is easily adapted for screening of other substances and behaviors in addition to its most common use for alcohol use disorder screening.[14] The CAGE does not distinguish between past and present problems, but it is an expedient and nonthreatening approach when assessing patients for the defining characteristics of potential substance use.[14]

BOX 34.2 Alcohol Screening

NIAAA Quantity and Frequency Questions

1. On average, how many days per week do you drink alcohol?
2. On a typical day when you drink, how many drinks do you have?
3. What is the maximum number of drinks you had on any given occasion during the last month?

CAGE Questions

In the Last 12 Months:

1. Have you ever felt like you should *C*ut down on your drinking?
2. Have people *A*nnoyed you by criticizing your drinking?
3. Have you ever felt bad or *G*uilty about your drinking?
4. Have you ever had a drink first thing in the morning to "steady your nerves" or get rid of a hangover (*E*ye opener)?

Screen Positive if:

A positive response on one or more questions from CAGE and/or consumption:
Men >14 drinks/week or >4 drinks/occasion
Women >7 drinks/week or >3 drinks/occasion
Over 65 years old >7 drinks/week or >3 drinks/occasion

NIAAA, National Institute on Alcohol Abuse and Alcoholism.
From National Institute on Alcohol Abuse and Alcoholism. *Helping patients who drink too much: A clinician's guide.* NIH Publication No. 07-3769. Retrieved from: http://pubs.niaaa.nih.gov/publications/practitioner/CliniciansGuide2005/guide.pdf

Collaborative Interventions

The clinical management of addictions and consequences of addictions by the generalist practice nurse consists of emergency management measures to stabilize life-threatening complications and nonemergency measures to facilitate recovery from substance misuse.

Emergency Management

Generalist practice nurses are likely to encounter many different emergency scenarios related to adverse drug reactions and/or overdose. The primary goal of emergency management is to prevent life-threatening complications that occur as a result of substance consumption or that result as the substance clears the system.[15] Agency-specific protocols should be followed when indicated.

Presenting signs and symptoms depend on the doses of substance or substance combinations that may have been taken, and the nurse should institute basic life-support measures as needed until toxicology findings are confirmed and resuscitation efforts are directed by advanced practice providers. Many agents affect the respiratory system, and respiratory management includes monitoring (rate, depth, and oxygen saturation) and support (oxygen administration, ventilation, and medication administration). Cardiovascular support includes monitoring (heart rate, blood pressure, and electrocardiograph) and support (intravenous fluids, medications, and/or resuscitation).

Opiate overdose. There is significant risk of death from respiratory arrest with opiate overdose. Naloxone is a rapid-acting drug that restores respiratory function almost immediately by blocking opiate receptors. Naloxone is frequently used by paramedics, police officers, and even family members as an emergency measure for opioid overdose in the community setting. Nurses and others who administer naloxone should be aware of the potential for injury to both the individual administering the drug and the individual receiving the medication because of the effects associated with this drug. The rapid reversal effect of the opiate is very uncomfortable and can cause fear and panic for the user when consciousness is restored.

Acute alcohol withdrawal syndrome. Acute alcohol withdrawal syndrome is a life-threatening condition that may occur unexpectedly whenever long-term, daily alcohol consumption is abruptly discontinued. This may occur in any setting—for example, upon admission to the hospital for some other reason. Patients may deny alcohol use for fear of legal implications or because of shame. Consequently, the nurse may be unprepared for the sudden onset of acute alcohol withdrawal syndrome (also known as *delirium tremens*).

The onset of alcohol withdrawal syndrome is highly variable, usually beginning within 6 to 9 hours of the last drink.[15]

Signs that may lead the nurse to suspect the onset of alcohol withdrawal syndrome are alterations in mental status, tremors, seizures, tachycardia, and hypertension. Late signs such as bradycardia or hypotension are indicative of cardiovascular collapse and the impending need for resuscitation. Other signs of possible alcohol withdrawal syndrome are irritability, depressed mood, impaired concentration, dizziness, hyperreflexia, ataxia, pyrexia, anorexia, and insomnia.[15]

Wernicke encephalopathy and Korsakoff syndrome. Wernicke encephalopathy and Korsakoff syndrome are two stages of the same emergency problem: Heavy alcohol use leads to poor nutritional intake and also inhibits B vitamin absorption (especially vitamin B_1 [thiamine]). This leads to alcohol neuropathy from irreversible brain damage with manifestations of psychosis, ataxia, abnormal eye movements, and death. Therefore, standard treatment for alcohol withdrawal for all patients should also include daily injections of B-complex vitamins.

Substance Misuse Recovery: Nonemergency Management of Addictions

During substance misuse recovery, the individual struggles to achieve sufficient willpower to maintain long-term sobriety from addiction. The essence of this struggle is known as the relapse process, and an understanding of the relapse process is essential to understanding addiction. For some, addiction recovery may only involve attendance to group support meetings, whereas others may have much more complicated rehabilitation needs. Rehabilitation refers generally to a broad spectrum of treatment options that may be inpatient or outpatient and may include initial detoxification treatment, group therapy, individual therapy, family therapy, psychoeducation, psychopharmacology, psychosocial rehabilitation, support groups (12-step and other peer-based programs), comprehensive community support services, and others.[5]

The term *recovery* is used to depict an individual who is sober from an addiction and getting the help needed to maintain sobriety.[5] In successful recovery, craving is recognized as part of the relapse process, and therefore coping strategies are planned in advance to prevent use of the substance or behavior in response to craving. Recovery is an ongoing process. as the individual moves through early sobriety from 1 month to 1 year, sustained sobriety from 1 to 5 years, and stable sobriety that begins at approximately 5 years.[3]

It is a common misunderstanding among many patients and even some clinicians that recovery means simply the absence of addictive behavior, as depicted by *line A* in Fig. 34.2. Recovery can be a complicated process as individuals are faced with daily obstacles that can act as triggers. Consequently, the recovery from addiction is rarely a straight line. Rather, as soon as anyone suffering from addiction begins to pursue freedom from it, the will of the addiction begins to draw him or her back into it. Therefore, recovery is better demonstrated by *lines B* and *C* in Fig. 34.2 because these lines depict the two opposing forces of will that pull, in one direction, down toward addiction and, in the other direction, up toward freedom. It is important for the person in recovery to understand that this process is normal

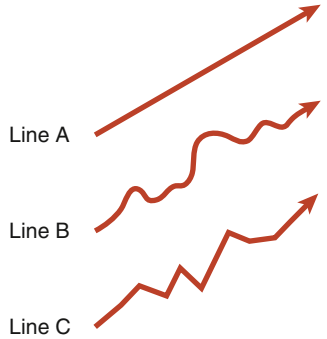

Fig. 34.2 Recovery and the Relapse Process.

so that his or her self-esteem can withstand any feelings of failure that may result from the inevitable relapse into craving. The idea is that relapse is recognized on the emotional and physical levels as a craving before substance use reoccurs. Therefore, use can be prevented by implementing the positive coping strategies as planned. Success in doing this enhances self-esteem and strengthens recovery, whereas failure to understand this can damage self-esteem and undermine recovery.

Often, it is said that an individual who has been struggling with addiction "has entered rehab." What this means is that, to a certain extent, the individual has overcome his or her resistance to changing an addictive behavior and is now motivated to commit to a treatment recovery program. The overarching goal of any rehabilitation program is to establish and maintain sobriety by helping the patient manage relapse challenges that will certainly arise. Rehabilitation may also include advanced practice care to manage any mood spectrum problems that emerge as addictive coping subsides. This specialized area of addiction care, which is known as the care for co-occurring disorders or dual diagnosis, is discussed in the next section.

Motivational interviewing. It is well known that in modern health care, patient outcomes are greatly influenced by the patient's motivation to change lifestyle behaviors.[12] There are hundreds of randomized controlled trials of the motivational interviewing method in health care that endorse this simple truth: Efforts to persuade patient to change increase their resistance to change. Nurses can be more effective by building therapeutic relationship with the patient and then collaborating with the patient to identify what behavior can be improved or changed.[5]

It has been reliably demonstrated that whatever approach is selected in the treatment of addiction, the most significant factor is the motivation of the patient. Motivational interviewing is especially useful in the management of addictions.[12] Motivational interviewing does not involve convincing the patient to do something different. Motivational interviewing focuses on developing a collaborative relationship between the healthcare provider and honors the autonomy of the patient to make informed decisions about his or her behavior. In motivational interviewing, the nurse should listen more than talk. The patient will almost certainly have ambivalent feelings about his or her problem behaviors, and it is important to understand the ambivalence. In particular, the benefits of the addiction should be well understood for any plan of change to be effective.

A woman who is homeless and addicted to amphetamines is a poignant example of the benefits of addiction. In this example, the woman's addiction to amphetamines began when she was sleeping in parks and shelters; her motivation to use the drugs emerged from a need to stay vigilant at night to avoid being raped, which had happened previously. In addition to the benefit of surviving the night, amphetamine use temporarily enhanced her mood in an otherwise bleak and hopeless setting and provided temporary relief from her symptoms of rape trauma syndrome. Once the individual's ambivalent situation is understood in this way, the patient and nurse can then collaborate to resolve the motivations underlying the addiction with a personal plan for recovery that anticipates relapse processes.

To enhance their abilities to do this, nurses are encouraged to participate in motivational interviewing workshops. As a brief overview, when patients are committed to change, the nurse is able to help them determine the best course of action, but most patients are not initially interested in change or they are ambivalent about changing. When the patient is not interested in changing, it is recommended that the nurse remain empathetic but raise doubt, provide information with permission, and let the patient know that he or she may return if an interest in change develops.[5]

When patients are ambivalent about changing addictive behaviors, the nurse should consider ways to tip the balance toward change without arguing. Arguing with an ambivalent person will put the person in a defensive position in which he or she is resistant to change. One way already discussed to tip the balance toward change is by analyzing the benefits of the addiction so that ideas for meeting the benefits by healthier means can be planned. Another technique is to develop a discrepancy between the patient's current behavior and important goals.

There are compassionate, respectful ways to point out discrepancies, and it is important that the nurse is authentic in his or her style of communication. In the example of the woman who is homeless and addicted to amphetamines, lecturing her on the harm of amphetamines is likely only to alienate her and make her defensive. As an alternative, the nurse might ask this patient how she would like her life to be in 2 years. Chances are she would like to have a nice home and a job, providing the nurse with a point of leverage because there is a discrepancy between having a nice home and job and being addicted to amphetamines.

The nurse should determine how motivated the woman is to achieve these goals and perhaps chat about how nice it would be to have her own apartment and a job. Patient motivation can be reported on a scale of 1 to 10. This opens the door to establish a discrepancy between amphetamine addiction and having a nice apartment and job. For example, the nurse might state, "Gosh, it would be really hard to hold down a job and pay rent while supporting an amphetamine addiction, wouldn't it?" Once the discrepancies are established, then resources for relapse prevention and support services can be arranged collaboratively.

Pharmacotherapy in substance misuse recovery. Relapse prevention is improved by reducing cravings, urges, and withdrawal symptoms. This is the aim of pharmacotherapy in recovery.[15] A complete discussion of the full scope of pharmacotherapy in the routine treatment of addictions is beyond the scope of this concept presentation, and there are numerous text sources available for information on this subject.[16] Table 34.1 presents common medications and their use.

TABLE 34.1 Pharmacologic Agents Used in Substance Misuse Recovery[16–18]

Pharmacologic agent	Use/benefit
Methadone	A long-acting opiate used to treat opiate withdrawal. May be prescribed as a replacement and gradually tapered once the withdrawal is stabilized.
Buprenorphine	A partial opioid agonist, used to treat opiate withdrawal as alternative to methadone. Higher doses can be administered with fewer side effects.
Suboxone	A combination preparation of buprenorphine and naloxone. Reduces the potential for buprenorphine misuse by eliminating the euphoria.
Clonidine	An antihypertensive agent that may also be prescribed for symptomatic relief of opiate withdrawal.
Nicotine	Nicotine in the form of gum, patches, nasal spray, and inhaler may be prescribed to alleviate withdrawal symptoms while tapering the dose of nicotine to zero.
Bupropion	Prescribed for nicotine withdrawal; it is a nonnicotine replacement medication that reduces craving.
Naltrexone, nalmefene, acamprosate	Prescribed used to reduce cravings for alcohol during withdrawal and recovery.
Disulfiram	Prescribed as aversion therapy for alcohol addiction to prevent impulsive drinking. If alcohol is consumed while taking disulfiram, the patience experiences severe headache, nausea, vomiting, palpitations, flushing, tachycardia, chest pain, and dizziness.

Co-Occurring Disorders

Also known as *dual diagnosis*, co-occurring disorders refer to the unique challenges faced by individuals who are chemically dependent and have serious psychological distress (SPD). There are two broad etiologies of co-occurring disorders. Persons with mental illness may turn to substance misuse to self-medicate SPD, or substance misuse may cause SPD. In either case, motivational interviewing is recommended as part of a comprehensive treatment approach to unravel the motivations that underlie the problem.[12]

Safe detoxification from the substances of misuse is usually the first step, but ongoing therapeutic communication skills such as active listening and affirmation will help establish trust so that the etiologies can be understood to avoid years of "revolving door" treatment for these individuals, sometimes labeled as "frequent flyers." By doing so, case management can be established to intervene in the underlying causes of the disorder. For example, there are likely to be logical benefits for the use of illicit drugs and alcohol for individuals with SPD.[9] Street drugs may alleviate symptoms of anxiety and psychosis. Intoxication may facilitate social interactions and mask

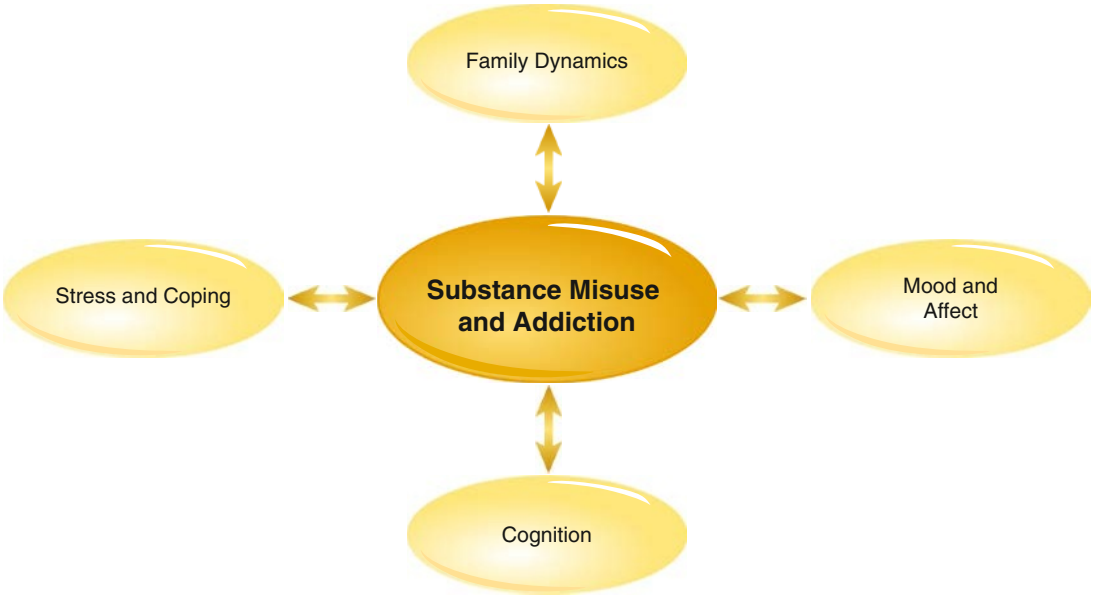

Fig. 34.3 Addiction and Interrelated Concepts.

psychosis as substance-induced manifestations—among the users of street drugs, substance-induced psychosis is socially acceptable, whereas psychosis from "being mental" is not. An understanding of all the logical reasons not to stop taking street drugs will facilitate the development of treatment plans that are more likely to result in long-term remission by addressing these needs as logical within the patient's social ecology.

There are some contraindications for the use of motivational interviewing in dual diagnosis. The patient might be too psychotic to benefit from motivational interviewing.[12] If so, the psychosis will have to be treated before motivational interviewing can be of any significant value. Patients exhibiting psychosis may be too dangerous for motivational interviewing.[12]

For patients who have a degree of orientation to reality despite their confusion or psychosis, the generalist nurse may modify the motivational interviewing method by frequently paraphrasing what the patient says to help maintain an organized dialogue. Nurses should try to keep motivational change talk very concrete and try to target adherence to medication and other treatment regimens. To avoid escalating anxiety, nurses should avoid exploring despair and instead explore the patient's motivation for using street drugs. As in the ordinary motivational interviewing method, once the motivation is understood, then discrepancy can be established between the outcomes of drug misuse and the patient's goals.[12]

INTERRELATED CONCEPTS

Substance Misuse and Addiction as a concept does not exist in isolation, and there are many interrelated concepts, depending on the specific context of the patient situation. Three common interrelated concepts are **Stress and Coping**, **Family Dynamics**, and **Cognition**. When coping, family dynamics, or cognition become ineffective, individuals are at increased risk for addiction. Conditions associated with the concept of **Mood and Affect** (particularly depressive and manic disorders) also overlap with a risk for addiction. Nurses will benefit by mentally applying the defining characteristics of addiction to these related concepts in their own analyses (Fig. 34.3).

CLINICAL EXEMPLARS

There are numerous exemplars of substance misuse and addiction, representing both substance addictions and behavioral addictions; some of the most common are presented in Box 34.3. This list is brought to life by the story of a student in an addictions' concept class discussion who mentioned that her boyfriend was addicted to pornography. Inspired to change by the harm his addiction was causing their relationship, he drove to a distant city where he discarded his entire pornography collection in a dumpster. Evidently, it became clear to him that he was unable to defeat the will of his addiction without help when he found himself in that same dumpster at 3:00 AM rummaging for remnants of his precious pornography collection.

Stories such as this clearly illustrate tolerance, withdrawal, deception, loss of willpower, and relapse, but interrelated concepts are also clear. The boyfriend's will for freedom was motivated by the harm his addiction had on his family dynamics, mood, and cognition, but his coping abilities were not adequate to withstand the will of addiction. The nurse's role in this story is to recognize how these concepts interrelate so that the boyfriend's motivation to cope can be strengthened with a collaborative plan that will vary, depending on the local resources and the individual's sense of what will work for him.

Featured Exemplars

Tobacco Use Disorder and Tobacco Withdrawal

Tobacco use is the most common addictive disorder and the leading cause of preventable disease, disability, and death.

BOX 34.3 EXEMPLARS OF ADDICTION

Substance-Induced Disorders

- Alcohol-induced disorders
- Cocaine-induced disorders
- Heroin-induced disorders
- Inhalant-induced disorders
- Marijuana-induced disorders
- Methamphetamine-induced disorders
- Opioid-induced disorders
- Tobacco-induced disorders

Substance Use Disorders

- Alcohol use disorder
- Cocaine use disorder
- Heroin use disorder
- Inhalant use disorder
- Marijuana use disorder
- Methamphetamine use disorders
- Opioid use disorder
- Tobacco use disorder

Behavioral Addictions

- Food addiction
- Gambling addiction
- Gaming addiction
- Internet addiction
- Sex addiction
- Shopping addiction

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOO

Nicotine, a stimulant in tobacco, increases arousal and alertness; increases heart rate, blood pressure, and cardiac output; and decreases appetite. Cigarette smoking is the most predominate form of tobacco use. It is estimated that 85% of people who smoke who try to quit on their own relapse within 1 week because of withdrawal symptoms that include irritability, cravings, depression, anxiety, cognitive and attention deficits, sleep disturbances, and increased appetite.[17]

Alcohol Intoxication

Alcohol intoxication is one of the most common substance-induced disorders. It occurs when alcohol is ingested faster than the liver can metabolize it. Physiological effects of alcohol intoxication are related to the dose. Euphoria, reduced social inhibitions, and flushed skin are associated with lower levels of alcohol intake. Drowsiness and progressive impairments in balance, coordination, judgment, and erratic or sometimes violent behavior occur with greater levels of alcohol intake.[18] Sufficiently high levels of intake lead to nausea, vomiting, and potentially lethal depression of the central nervous system.

Alcohol Use Disorder

Alcohol use disorder (AUD) is one of the most prevalent of the substance use disorders. It is estimated that 1 in 10 Americans[9] and more than 400,000 adolescents between ages 12 and 17 years had an AUD,[9] but it is estimated that during the COVID-19 pandemic, that number decreased because of limited social contact with other teens.[19] AUD results from long-term excessive alcohol use and is characterized by the inability to cut down or stop drinking, craving, interference with family or job, alcohol tolerance, withdrawal, deception of the self and others, and relapse processes (loss of willpower).

Opioid Use Disorder

Opioid use disorder involves the misuse of a wide range of drugs including prescription medication (codeine, morphine, and oxycodone), illicit street drugs (e.g., heroin, fentanyl), and drugs to treat addictions (e.g., methadone). Opioids cause central nervous system depression, leading to analgesia, euphoria, drowsiness, relaxation, and detachment from the environment and impaired decision making. Opioid use disorder has become an epidemic. The National Institute on Drug Abuse (NIDA) maintains data relative to all death resulting from drug overdoses. More than 930,000 drug overdose deaths have occurred since 1999, and approximately 75% or just over 670,000 of those deaths occurred as the result of an opioid overdose.[20]

Over the course of opioid epidemic, much attention has been brought to the drug fentanyl. Fentanyl is a powerful pain medication used in the treatment of severe pain associated with advanced cancer or pain associated with surgery. Fentanyl can be up to 300 times more potent than morphine. Illicit fentanyl has been an increasingly more available as a street drug.[20] As a street drug, fentanyl is typically available in manufactured tablets, powder, and through spiked blotter paper (placed on the tongue). Often fentanyl is laced or cut with other substances, typically less expensive drugs (e.g., heroin, cocaine, and methamphetamine), that increase potency. Often users are unaware that fentanyl has been laced, and this has led to an increased number of deaths. It is estimated that approximately 175 Americans die each day from a fentanyl overdose.[20]

Gambling Disorder

Compulsive gambling, a behavioral addiction, involves an uncontrollable urge to gamble despite social consequences. Gambling disorder is characterized by gaining a thrill from gambling risk; preoccupation with gambling; taking increasingly larger gambling risks; and using the behavior as a means to cope with problems, guilt, or depression. Gambling disorder closely resembles substance use disorders in the physiological response but also social consequences, including relationships, economic, and occupational. It is estimated that 0.5% of all of adults in the United States have experienced a gambling problem—representing approximately 1 in 200 individuals with a gambling disorder.[21]

CASE STUDY

From NADOFOTOS/iStock/Thinkstock.

Case Presentation

Jim Wright is a 45-year-old male. He is married to Darla and has two children: 16-year-old Ryan and 9-year-old Jenny. The interview with Jim stemmed from a family therapy meeting to plan Jim's care in a substance treatment program. Jim is charming, funny, and talkative. His interview began with the CAGE questionnaire, and Jim affirmatively acknowledged all four CAGE questions. Jim further acknowledged more than two decades of heavy alcohol and substance use. He says he has tried Narcotics Anonymous and Alcoholics Anonymous meetings, "but they didn't help much." He says that after such meetings, he and other addicts would go out to drink and use drugs together.

Jim says tearfully that he has tried family therapy as well, "because of me, our whole family is screwed up." As a youth, Jim was involved in gang activity; at age 16 years, he served time in the youth detention system for assault and battery and making threats with a deadly weapon. Jim has been arrested and incarcerated numerous times for reasons related to drug and alcohol use. While in jail, Jim would drink a fermented jailhouse concoction called "pruno" and use drugs with other inmates.

Jim has recently been released from jail and Darla has told him she does not want him around until he can stop drinking and using drugs. He plans ways to manipulate Darla into taking him back. His current plan is to be kind and generous with her at first, and he thinks he "might even have to get a job for a while." Knowing rules of confidentiality, Jim admitted that coming in for this interview was part of manipulating Darla.

"Alcoholism runs in the family," Jim says. Like others in his family, Jim has gone through alcohol withdrawal several times. "Withdrawal sucks," he says. "It can last a couple days or more… my skin feels like something is crawling on it, and my heart pounds. Last time I went through withdrawal I was in jail and almost died from a seizure. I needed some Valium for that, but since I was in jail they didn't care."

Case Analysis Questions

1. How does this case reflect relationship issues associated with substance use and addiction?
2. What risk factors are present in this case?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 35

Interpersonal Violence

Paul Thomas Clements

Violence is pervasive in our society; it affects people across the human continuum regardless of age, race, religion, geography, financial status, gender expression, and sexual orientation. A form of violence is interpersonal violence (IPV). The significance of IPV is well-reflected by the World Health Organization (WHO) statement that IPV is

> *a leading cause of death among adolescents and young adults in most parts of the world. Exposure to interpersonal violence increases individuals' lifelong vulnerability to a broad range of emotional, behavioral, and physical health problems. Interpersonal violence directly affects health care expenditures worldwide; indirectly, it affects national and local economies—stunting development, increasing inequality, and eroding human capital*[1,p.1]

Despite the emphasis on research, enhanced assessment, and related interventions to address IPV, there are ongoing challenges including a pervasive lack of consistent clinical practice that includes sensitive, yet comprehensive, approaches and referral. Certainly, the challenges related to IPV are multifaceted. Perhaps violence itself is part of the human condition; however, it is, at the very least, destructive in nature. Although there are legal and moral rules, cultural traditions, political beliefs, and religious ramifications surrounding violence, it remains that such actions are always a potential manifestation of humanity. The purpose of this concept presentation regarding the role of the nurse relative to IPV is to expand awareness, establish enhanced and targeted assessment, and identify the foundations of intervention and referral.

DEFINITION

There are a number of definitions that are associated with this concept. *Violence* is defined by the WHO Violence Prevention Alliance as "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychologic harm, maldevelopment, or deprivation."[2]

Three subtypes of violence present in the definition include self-directed violence, collective violence, and IPV. For the purposes of this concept presentation, IPV specifically is defined as "*the intentional use of physical force or power by an individual or small group of individuals against other person or persons and encompasses physical, psychological, sexual violence as well as neglect and/or deprivation.*"[3]

Two categories of IPV are recognized: family/partner violence and community violence.

Family/partner violence involves IPV directed at a family member or partners. It includes child abuse/maltreatment, elder abuse/maltreatment and intimate partner violence. Assault, battery, homicide, weapon use, kidnapping, and unlawful imprisonment are frequent crimes associated with family violence. *Community violence* involves IPV between individuals who know each other, but who are not related or partners. Common examples of community IPV include youth violence, bullying, sexual assault or rape, and violence within instructional settings such as the workplace or schools.[3] When violence includes the use of power, then other elements come into play, including coercion and threats, intimidation, emotional abuse, isolation, economic abuse, and use of any children as methods of control. This concept does not pertain to abuse or violence by strangers, street crime, gang warfare, or military conflict.

SCOPE

The scope of IPV is often thought of and communicated in terms of incidence and prevalence. Multiple reports and data illustrate the extent and pervasive nature of this concept. For example, in 2022, it was reported that at least 5 million acts of IPV occurred annually to women aged 18 years and older, with more than 3 million involving men.[4] As another example, in 2019, the National Violent Death Reporting System indicated that every month, an average of 70 women were shot and killed by an intimate partner.[5]

Although statistics are useful in confirming the widespread presence and prevalence of IPV, they alone are insufficient to gain an understanding of the elements involved. IPV is a complex concept seen in many forms across the lifespan. As shown in Fig. 35.1, the scope of IPV includes the recipient of the violence and the offender, often referred to as the *perpetrator*. The

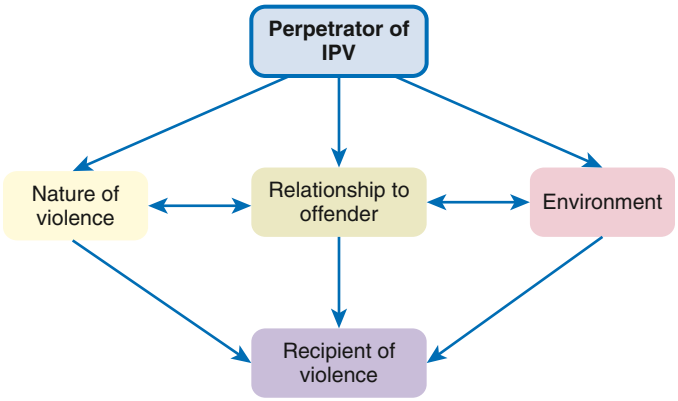

Fig. 35.1 Scope of Concept: Interpersonal Violence.

scope also includes the nature of the violence, the environment in which the violence occurs, and the relationship between the perpetrator and the recipient of the violence.

Johnson[6] discusses a model of IPV that describes patriarchal terrorism and situational violence. Patriarchal terrorism includes cases in which the perpetrator attempts to dominate and assume control over the victim; this is the most physically violent category. Situational violence occurs when a perpetrator initiates physical aggression in response to situational conflict. Direct acts of abuse and neglect often progress to become a regular part of the pattern of violence. As physical violence increases, danger of death also increases.

VARIATIONS AND CONTEXT

There are many categories of IPV that are seen across the lifespan. The most predominant categories in the literature are shown in Fig. 35.2. Many elements within these categories overlap, so these are not to be interpreted as mutually exclusive.

Abuse and Neglect

Abuse, neglect, and maltreatment can occur at any age, but those most vulnerable include children and older adults.

Child Abuse and Neglect

The abuse and neglect of children encompass a wide variety of forms of child maltreatment, including physical abuse, sexual abuse, and neglect. Offenders usually include parents, other family members, individuals living in a home, and individuals in a caretaking role. The Federal Child Abuse Prevention and Treatment Act defines child abuse and neglect as occurring when there is any recent act or failure to act on the part of a parent or caretaker that results in death, serious physical or emotional harm, sexual abuse or exploitation, or when there is any act or failure to act that presents an imminent risk of serious harm.[7] It is imperative for those working in health care to be aware of the pervasive myths and stereotypes that surround child abuse and neglect (Box 35.1).

Elder Abuse and Neglect

Elder abuse also encompasses a wide variety of forms of maltreatment including physical abuse, emotional abuse, sexual abuse, exploitation, neglect, and abandonment.[8] Offenders include youth, family members, spouses, or staff at nursing, assisted living, and other facilities. Older adults most likely to be abused are those with functional impairments, physical disabilities, or poor physical health; those living with a large number of household members other than the spouse; and those with a lower income or living in poverty.[9] National estimates indicate that 1 in 10 older adults experience abuse;[9] however, prevalence estimates are possibly underestimated by the fact that many people with dementia or other intellectual, psychological, or emotional disability are unable, frightened, or embarrassed to report abuse. Ultimately, elders can become prisoners to their caregivers, and death is often the end result of the abusive cycle.

Youth Violence

Youth violence is a widespread and serious public health problem in the United States and represents an adverse childhood experience (ACE) that can have long-term effect on health and well-being. Youth violence is the intentional use of physical force or power to threaten or harm others involving young people ages 10 to 24 years. A young person can be experience youth violence as a victim, an offender, or as a witness. The violence can include fighting, bullying, threats with weapons, and gang-related violence. Patterns of behavior change over developmental stages; specifically, during teen and young adult years. In 2021, the Centers for Disease Control and Prevention[10] noted that:

- Homicide is the third leading cause of death for young people ages 10 to 24 years and the leading cause of death for non-Hispanic Black or African American youth.
- More than 1000 youth a day are treated in emergency departments for physical assault-related injuries.
- Sexual minority teens are more likely to experience multiple forms of violence compared with their heterosexual peers.
- Youth violence disproportionately affects Black or African American youth and young adults; this population is also at higher risk for the most physically harmful forms of violence (e.g., homicides, fights with injuries, aggravated assaults) compared with White youth and young adults.

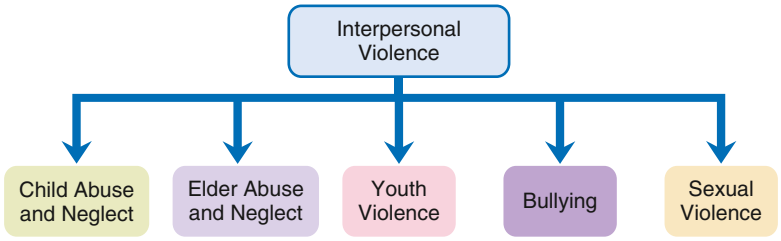

Fig. 35.2 Categories of Interpersonal Violence Across the Life Span.

BOX 35.1 Myths About Child Abuse

Myth: It's only abuse if it's violent.
Fact: Physical abuse is just one type of child abuse. Neglect and emotional abuse can be just as damaging, and because they are more subtle, others are less likely to intervene.
Myth: Only bad people abuse their children.
Fact: Not all abusers are intentionally harming their children. Many have been victims of abuse themselves, and don't know any other way to parent. Others may be struggling with mental health issues or a substance abuse problem.
Myth: Child abuse doesn't happen in "good" families.
Fact: Child abuse doesn't only happen in poor families or bad neighborhoods. It crosses all racial, economic, and cultural lines. Sometimes, families who seem to have it all from the outside are hiding a different story behind closed doors.
Myth: Most child abusers are strangers.
Fact: Although abuse by strangers does happen, most abusers are family members or others close to the family.
Myth: Abused children always grow up to be abusers.
Fact: It is true that abused children are more likely to repeat the cycle as adults, unconsciously repeating what they experienced as children. On the other hand, many adult survivors of child abuse have a strong motivation to protect their children against what they went through and become excellent parents.

From: Stop Abuse Campaign. (2018). *Child abuse and neglect: How to spot the signs and make a difference.* http://stopabusecampaign.org/2018/02/12/child-abuse-and-neglect-how-to-spot-the-signs-and-make-a-difference/

Bullying

Bullying is the most prevalent form of violence perpetrated globally by youth.[11] It is an unwanted, aggressive behavior that involves an imbalance of real or perceived power and is repeated (or has the potential to be repeated) over time.[12] Bullying consists of intimidation or domination toward an individual who is perceived as weak and is often done as a way to establish perceived superiority over another or to get something through coercion or force. Bullying tactics can be physical, verbal, or emotional—often through social and cyberbullying approaches. Examples of bullying behavior include making threats, spreading rumors, attacking someone physically or verbally, and excluding someone from a group on purpose. As a result of multiple school shootings in the United States, professionals have increased their attention on school bullying.[13]Although most prevalent in school-age children and adolescents, bullying also exists and is reported in adults—most commonly in the workplace.[14]

Sexual Violence

The term *sexual violence* is an all-encompassing, nonlegal term that refers to crimes such as sexual assault, rape, and sexual abuse. Sexual assault can happen to anyone, regardless of age, birth sex, gender expression, or sexual orientation. Sexual violence can occur regardless of the relationship between the perpetrator and victim and in any setting, including, but not limited to, home and work. An estimated 80% of sexual assaults are committed by someone known to the victim.[15]

BOX 35.2 Types of Rape

- *Acquaintance rape:* An umbrella term used to describe sexual assaults in which the survivor and perpetrator are known to each other, whether by passing acquaintance or someone the survivor knows intimately. This is the most common form of rape.
- *Date rape:* A specific kind of acquaintance rape that occurs when the victim is raped by the person they are on the date with.
- *Spousal or partner rape:* Occurs between two individuals who are in a relationship. Sexual violence often works alongside other abusive behaviors related to Intimate Partner Violence.
- *Stranger rape:* Occurs by a perpetrator who is unknown to the victim.
- *Statutory rape:* Occurs when a perpetrator has unlawful intercourse with a minor, even if intercourse was consensual.

Data From: Peace Over Violence (n.d.). *Types of sexual assault.* https://www.peaceoverviolence.org/i-types-of-sexual-violence

The legal definition of *sex-related crimes* varies from state to state, and there are often other crimes and forms of violence that arise jointly with sexual crimes. Rape is a form of sexual assault, but not all sexual assault is rape. The definition of rape is "penetration, no matter how slight, of the vagina or anus with any body part or object, or oral penetration by a sex organ of another person, without the consent of the victim."[16]

This definition includes instances in which the victim is incapable of giving consent because of temporary or permanent mental or physical incapacity, including as a result of the influence of drugs or alcohol or because of age. Physical resistance from the victim is not required to demonstrate lack of consent. The ability of the victim to give consent must be determined in accordance with laws in each state. Various typologies of rape are presented in Box 35.2.

CONSEQUENCES

The consequence of IPV is highly variable and complex. Some of the most obvious factors that influence consequences include the type, extent, and severity of the IPV, the age of the victim, the relationship between the victim and perpetrator, and the frequency and duration of IPV events. Regardless of the type of IPV, consequences fall into two major areas: physical and psychosocial consequences. These are often interrelated.

Physical Consequences

Physical consequences of any form of IPV include the physical injury and the accompanying pain, need for repair, and related recovery time. Common patterns of injury and related symptoms that have been identified in the literature range from sustaining minor injuries such as scratches, bruises, and swelling, to more severe injury if the abuse is frequent and harsh. Some of the most common direct injuries are bruises, lesions, and cuts, headaches, back pain, and fractures.[17] The majority of fractures experienced by victims of assault involve the face, and typically these injuries involve the craniofacial region. Fractures associated with IPV are often caused by a punch or kick to the face and prominent points are targeted, such as the cheek, the angle

of the jaw, and the nose.[18] In cases of attempted strangulation, there may be both significant physical and emotional sequelae.[19] Violence that occurs during pregnancy can have detrimental effects on the mother and fetus—including, most significantly, an increased risk for homicide.[20]

Consequences of sexual violence depend on the age of the victim, the relationship between the victim and the perpetrator, the circumstances of the environment, and the severity and/or types of other violence accompanying the incident. Common physical consequences include trauma to external genital, vagina, and/or anus, unintended pregnancy, and gynecologic problems such as bleeding, infection, pain during intercourse, chronic pelvic pain, sexually transmitted diseases, HIV transmission, and urinary tract infections.[21]

Physical consequences from IPV also include long-term health problems associated with stress and anxiety. Studies have found an increase in chronic health problems, such as gastrointestinal disorders and cardiovascular conditions, when previously exposed to IPV.[22,23]

Psychosocial Consequences

There are innumerable psychosocial consequences associated with IPV; some are more apparent than others. Each victim has a unique set of coping skills; thus, the effect of IPV may be moderated by an individual's resilience as a protective mechanism. For this reason, there is no way to predict long-term consequences for any one person. That said, there are several common psychosocial consequences reported in the literature.

Posttraumatic Stress Disorder

One of the most common mental health consequences of exposure to IPV is posttraumatic stress disorder (PTSD).[24] The incidence of PTSD among those exposed to IPV varies based on the presence (or lack of) supportive factors; however, the nature, severity, and frequency of the of the violence is often predictive of the severity of the symptoms of PTSD. For instance, the use of a weapon during a violent assault or repeated episodes of sexual abuse may typically result in more severe symptoms than a one-time physical assault where the offender demonstrates sincere remorse. Subsequently, repeated episodes of physical or sexual abuse may result in long-lasting physical and emotional effects. The characteristic symptoms of PTSD are threefold: (1) reexperiencing the trauma, which includes intrusive and recurrent thoughts, images, and flashbacks of the violence; (2) a biphasic response of avoidance and numbing; and (3) increased arousal. These are manifest intrapsychically and interpersonally, including feelings of detachment and persistent avoidance of memories that relate to the violence while simultaneously experiencing increased arousal that can include insomnia, difficulty focusing, and hypervigilance.[25,26] Children who are exposed to violence and witness violence may experience many fears and worries that are otherwise developmentally inappropriate such as PTSD, which is often more detrimental than the violence itself. Guilt is highly correlated with the severity of PTSD, and resolving guilt is difficult because of the child's inability to accept that the violence was beyond his or her control.

Depression

Another common consequence of IPV is depression. Depression inhibits the ability of abused individuals from formulating a plan to deal with the abuse. This inertia prevents the victim from taking proactive steps to leave the abusive situation or, if they do leave, the ability to place the violence into a perspective that allows them to reinvest in an enjoyable and productive lifestyle.[27,28] Humphreys and Lee reported that the presence of social support mitigates the depressive effects of IPV.[29] When an individual experiences depression, there is an increased risk of suicide, and there are particularly increased suicide attempts in women experiencing IPV.[30]

Psychological maltreatment during childhood is associated with multiple emotional problems such as anxiety, depression, low self-esteem, and suicidal ideation.[31–33] Exposure to intrafamilial violence as a child often leads to anxiety and depression.[34] Bully victims often view themselves as outcasts and failures; they too often display signs of anxiety and depression in conjunction with isolationism, school absenteeism, loneliness, and suicidal ideation.

Learning, Social, and Cognitive Function

There is a common misconception that infants and young children are minimally affected by IPV because of their limited life experiences and cognitive awareness of their environment. However, this is not the case. The consequences of childhood IPV are determined by the frequency and type of violence inflicted; unfortunately, the consequences can be quite severe. Because the development of young children is strongly affected by their caregiving environment, exposure to IPV can have a detrimental effect on the cognitive and emotional development of infants and young children, setting the stage for the inability to integrate sensory, emotional, and cognitive information for optimal responses to stress. Children who have been subjected to abuse or neglect often have developmental delays, learning problems, passivity, low self-esteem, social competency problems, isolating behavior, and social phobia.[31–33] Being bullied also can throw a long shadow over affected children's lives. It has been demonstrated that victims of bullying tend to have poorer cognitive and social functioning far into adulthood and are at increased risk for adverse health problems.[35,36]

Behavioral Issues

Many behavioral issues are associated with IPV. Long-term health consequences of childhood abuse are often related to specific behavioral risk factors associated with impulse control problems as smoking, substance abuse, poor diet and/or eating disorders, and lack of exercise linking to many illnesses in adulthood, including ischemic heart disease, cancer, chronic lung disease, irritable bowel syndrome, and fibromyalgia.[31] Children who are sexually abused may display developmentally inappropriate sexual behavior, such as age-inappropriate knowledge, sexual preoccupation, and inappropriate displays of excessive masturbation.[37]

Aggression, Violence, and Criminal Behavior

Unfortunately, there is a connection between IPV during childhood and aggressive behaviors as adults. For example, there is

strong evidence that childhood bullies are at risk of developing antisocial behaviors as adults.[38] In addition, adult childhood bullies are likely to have more criminal convictions and traffic violations than their less aggressive peers.[39] A history of childhood maltreatment often results in childhood delinquency and adult criminality, and they are more likely to become violent as adults.[40] Multiple emotional problems and social competency problems are associated with psychological maltreatment during childhood including aggression, violent behavior, and juvenal delinquency.[31–33] Exposure to intrafamilial violence also often leads to behavioral problems such as aggression.[34]

RISK FACTORS

As mentioned previously, IPV spans all age groups, races, and ethnicities. It is not restricted to any one special interest group or any socioeconomic group and involves all gender expressions. Literally, all individuals have potential risk of experiencing IPV—as a recipient, perpetrator, or witness of violence. Violence has many complex linkages. Some factors are relative to one type of IPV, but in many cases there are commonalities in that violence can share multiple and identical risk factors.

Populations at Risk

Infants and Children

Infants and children are at risk for abuse because of the power differential that exists with adolescents and adults. Because of their physical size and ongoing psychosocial development, they are typically unable to resist the abuse and unable or fearful to report it, relative to a pervasive expectation of actual retribution by the abuser. IPV is highest among infants from birth to 1 year of age, with the rate decreasing with increasing age, although it tends to escalate in severity over time, particularly related to significant risk for death in children and adolescents.[41] Box 35.3 presents current data related to child abuse.

BOX 35.3 Child Abuse: How Common Is it?

In 2019, there was a national estimate of 656,000 victims of child abuse and neglect (representing a rate of 8.9 victims per 1000 in the population) and a total of 1840 fatalities (or a rate of 2.50 fatalities per 100,000 children). Victim demographics included

- Children in their first year of life had the highest rate of victimization and 45.4% of child abuse fatalities involved children under 1 year of age.
- The victimization rate was higher for girls than boys (9.4 compared with 8.4 per 1000 in the population) but boys had a higher fatality rate than girls (2.98 compared with 2.20 per 100,000 in the population).
- American Indian/Alaska Native children had the highest rate and African American children had the second highest rate of victimization (14.8 and 13.7 per 1000 in the population, respectively). The rate of African American child fatalities was 2.3 times greater than the rate of White children and 2.7 times greater than the rate of Hispanic children.

Data From: Child Welfare Information Gateway. (2021). *Child Maltreatment 2019: Summary of Key Findings*. https://www.childwelfare.gov/pubpdfs/canstats.pdf; World Health Organization (2020). *Child Maltreatment*. https://www.who.int/news-room/fact-sheets/detail/child-maltreatment

Older Adults

Some people consider older adults as burdens and nonproductive members of society. This is reflective to the concept of Ageism, which is the stigmatization of older people, and is likely an element of the etiology of elder abuse. Older adults with impaired cognitive function and/or who lack independent functional ability, are at greatest risk for abuse for similar reasons as infants and children; specifically, a power differential exists so that they may be physically unable to resist or lack the cognitive capacity to report. In addition, there may be a realistic fear for retaliation—physically, emotionally, or financially. Primary factors that place elders at greatest risk IPV include dependence on others (family members, caretakers, and agency staff), physical frailty, and cognitive limitations.[42,43]

Gender and Identity

Although IPV affects both men and women, young women, particularly women of color, experience IPV at higher rates. An estimated 6.5 million women in the United States experience contact sexual violence, physical violence, or stalking by an intimate partner in a single year.[44] The overwhelming incidence of IPV is perpetrated by men to women, although men who are victims may underreport. It is estimated that 1 in 10 men in the United States experienced contact sexual violence, physical violence, and/or stalking by an intimate partner during their lifetimes and some form of IPV-related effect. Men and boys who have been sexually assaulted or abused may have many of the same feelings and reactions as other survivors of sexual assault, but they may also face some additional challenges because of social attitudes and stereotypes about men and masculinity.[45]

In general, people who are lesbian, gay, bisexual, transgender, or questioning (LGBTQ) face increased risk of violence compared with non-LGBTQ populations, and this increased risk extends to intimate partner violence. Rape, physical violence, or stalking by an intimate partner is experienced by 44% of women who are lesbian and 61% of women who are bisexual compared to with 35% of women who are straight. In addition, 54% of people who are transgender experience intimate partner violence in their lifetimes.[46]

Individual Risk Factors

Substance Use

A common underlying factor associated with IPV involves the use/misuse of alcohol. Alcohol has been reported to be a significant risk factor in IPV, child abuse, youth violence, and elder abuse. Substance use and misuse plays a facilitative role in IPV by inhibiting impulse control, thereby increasing the risk for precipitating or exacerbating violence. The strong relationship between substance abuse and perpetration of IPV has been noted across healthcare settings[47] and is also frequently observed and reported among individuals presenting at psychiatric and substance abuse treatment settings.[48]

Mental Health Conditions

Studies have shown a link between those with mental health diagnoses and violence, in that there is a high rate of lifetime

victimization among psychiatric patients.[49] Aggressive behavior has been linked to schizophrenia, mania, alcohol abuse, organic brain syndrome, seizure disorder, and personality disorders. Furthermore, among patients in acute psychiatric settings, young age, male sex, history of psychiatric illness, comorbid substance abuse, and positive symptoms (e.g., hallucinations, delusions, paranoia) have been shown as consistent predictors of violent behavior. Among these, the history of violence is often emphasized as the most significant predictor of future violence.[50]

Neurobiology and Genetics

Violence is closely related to criminality because most violence is criminal in nature. Raine[51] proposed that violence and criminality may have a biologic basis—a concept that continued to expand in the contemporary era of increased understanding of neurobiology and the expanding research on genetics and intergenerational transmission risks.[52,53]

Exposure to Violence in Childhood

Children can experience the harms associated with IPV through awareness of violence between caregivers, even if they have never directly observed any acts of violence. In fact, exposure to intimate partner violence is increasingly being recognized as a form of child maltreatment.[54] Despite the attempts by many parents to hide what is going on, children know about violence in their home, and are often caught in the crossfire of events occurring between the abuser and victimized intimate partner.[55] IPV of the adult partner (e.g., the mother) usually progresses to abuse of the child. Individuals who were witness to and/or the victim of IPV during childhood are at greater risk of becoming perpetrators as adults; this is especially notable with intimate partner violence and child abuse.[56]

Sociocultural Factors

Low socioeconomic status is not in itself a risk factor for IPV, but women living in poverty are disproportionately affected.[57] A high socioeconomic status has generally been considered to be protective against IPV but this is not always the case.

Cultural and social norms are highly influential in shaping individual behavior, including the use of violence. Norms can protect against violence, but they can also support and encourage the use of it. For instance, cultural acceptance of violence, either as a normal method of resolving conflict or as a usual part of rearing a child, is a risk factor for all types of IPV.[58] Other cultural norms exist that perpetuate IPV. For example, the tradition of not interfering in matters between family members that occur in private has led to reluctance for government, the criminal justice system, and other systems to respond to domestic violence, even after it became a crime. "Music and the media continue to portray domestic violence as 'lover's quarrels' and domestic violence homicides-suicide as 'crimes of passion' by jilted men who think, 'If I can't have her, no one else will.' This 'romanticizing' of domestic violence allows it to be excused or explained away—something that is not done with any other type of assault and battery."[59]

ASSESSMENT

Nurses should keep interpersonal violence in mind during the health assessment and be vigilant in recognizing important clinical clues.

History

There are certain elements in the medical history that raise concern for physical abuse. Victims may provide a history of events that is incomplete or inconsistent with injuries seen. Many individuals who experience IPV are unable or afraid to provide an accurate account of events. Specific examples include a history of trauma that is inconsistent or implausible with the physical examination, a history of no trauma with evidence of injury, a history of self-inflicted trauma that is developmentally unlikely, and, for children, serious injuries blamed on siblings or playmates.

Direct questioning may not be the best way to determine whether abuse has occurred. For example, asking a patient "Have you ever been physically, sexually, or emotionally abused?" may not generate an honest response, particularly if the patient has known the nurse for an extremely brief time. There may be an inherent lack of trust for revealing such information and a high level of uncertainty and anxiety regarding the consequences of doing so. It is quite possible that the patient may have been abused for years and never reveal this information to any healthcare professional they have just met. The patient may also feel threatened by the abuser to maintain the secret. Asking such sensitive questions in a more global manner may reduce anxiety and may help the patient determine what information (if any) to disclose. In fact, standard screening questions are incorporated into many health histories. For example, the nurse might matter-of-factly ask, "Some people don't feel safe in their home. Are there any times that you feel unsafe in your home? If so, we would be able to provide assistance to help with that situation" or "Have you ever been concerned for the safety of your children? If so, we could explore some approaches that could be helpful in making sure that they are safe." Another example could include: "Sometimes people in a relationship make their partners feel afraid or scared. They might, for example, intimidate them, break or throw out their possessions, threaten to hurt them or someone they care about, hurt their pets, or physically attack them. Does anything like this happen in your relationship? If this has ever happened to you, could you share some information about that?" If the patient chooses not to disclose, it is important to document any observations, both physical and emotional, and include direct quotes of relevant information, which can be significantly useful.

Examination Findings

There is no specific examination procedure for IPV. If a person discloses IPV as part of the history, the examination will be influenced by what is shared. As noted previously, many individuals do not disclose IPV, so nurses should recognize findings that could be associated with IPV; these findings can range from subtle to obvious. Some may manifest as old or new injuries that

may seem mild to more significant (e.g., cuts, bruises, burns, or fractures) and may not raise concern. For this reason, it is critical to consider the history in relation to injuries seen. The nurse should also maintain a high degree of awareness for injuries that are not typically seen in the context of day-to-day living, such as unusual patterns of bruising or burn marks; in addition, inconsistent and/or implausible explanations are of significance (e.g., a child has a patterned injury of bruising behind the knee that could not have been received from "falling off of a bicycle"). Regardless of the explanation, all suspected child abuse must immediately be reported to the local or state child protective services agency because all nurses are mandated reporters.

In some cases, specific physical injuries are commonly seen with a type of IPV; for example, IPV often includes physical assault, which can include injuries to the neck, from attempted strangulation, and to the head. Both types of injuries can result in traumatic brain injury (TBI). Head trauma is common in infants and young children. Abdominal injuries caused by punching or kicking, which lead to internal bleeding, are the second most common cause of death in child abuse. Burns are a common injury associated with abuse; in fact, it is believed that 10% of all physical abuse cases involve burns, usually with scalding water. Specifically, burns with a stocking pattern or circular burn marks always should raise suspicion.[60]

CORE COMPETENCIES

Interpersonal Violence

- Demonstrate knowledge of basic scientific methods and processes as it relates to assessment and interview of patients related to interpersonal violence
- Demonstrate clinical judgment founded on broad knowledge of interpersonal violence
- Using a person-centered approach, perform a clinically targeted assessment, recognizing actual or potential health problems related to interpersonal violence.
- Collaborate with the interprofessional team to establish mutual healthcare goals for consistent assessment, referral, and reporting related to interpersonal violence for individuals, communities, or populations.
- Using a person-centered approach, educate individuals and families regarding self-care for health promotion, illness prevention, and illness management related to interpersonal violence.
- Communicate findings of the functional assessment to the interdisciplinary care team.

CLINICAL MANAGEMENT

Primary Prevention

The prevention of IPV is considered a key public health priority. Although the actual cause (or combination of contributing factors) of IPV remains unknown, what is known is that approaches for primary prevention continue to be minimally understood. The National Center for Injury Prevention and Control is the lead federal organization for violence prevention; one of its three divisions is the Division of Violence Prevention (DVP).[61] The strategic directions established by the DVP include reducing rates of various forms of violence (including child maltreatment, intimate partner violence, sexual violence, and youth violence) through individual, community, and societal change. A comprehensive discussion of the national strategic direction for the DVP is beyond the scope of this concept presentation, but it is important for nurses to know these directions exist and are readily available on the Centers for Disease Control (CDC) website.

What is of significant importance is that exposure and experience of violence is preventable in childhood and adolescence. The ultimate goal is to stop youth violence before it starts, as it often continues into adulthood. School engagement is a protective factor for victims, and schools can mitigate the ill effects of bullying and related violence by changing the school structure. The DOJ highlighted what victims need from their schools.[62] These include

- A place of refuge where they can feel safe, appreciated, and challenged in a constructive way
- Responsible adults who can support and sustain them and provide them examples of appropriate behavior
- A sense of future possibility to persuade them that staying in school, despite the bullying, promises better things to come

These factors have demonstrated the capacity to facilitate bullied students and those who are victims of violence to overcome the potential for long-lasting effects of bullying.

Secondary Prevention (Screening)

Evidence demonstrates that screening, during encounters in healthcare settings, increases the identification of women, children, and families-at-large experiencing IPV. Screening and counseling for IPV can identify survivors and, in some cases, increase safety, reduce abuse, and improve clinical and social outcomes.[63] In fact, the U.S. Preventive Services Task Force specifically recommends that clinicians screen all women of reproductive age for intimate partner violence and refer women who screen positive for appropriate support services.[64] Multiple barriers for implementation of IPV screening and counseling exist, including clinician concerns about time; limited incentives for screening; either nonexistent or poorly implemented policies to guide clinicians and practices in conducting screening; and lack of knowledge and confidence about how to support a patient who discloses IPV.[63] Addressing barriers and improving screening, counseling, and referral practices require attention to multiple levels within the healthcare delivery system to create a safe, trusting environment for patients.

Many screening tools have been developed for various types of IPV in a number of healthcare settings. Nurses should be aware of appropriate tools to use in various settings, such as emergency departments, school-based clinics, inpatient settings, or community-based clinics. A useful resource for screening tools is the Intimate Partner Violence and Sexual Violence Victimization Assessment Instruments for Use in Healthcare Settings, which is published by the Centers for Disease Control and Prevention.[65] This resource presents a variety of screening tools that have been tested and validated for multiple types of IPV and among various population groups (age and ethnic/cultural). Nurses are encouraged to become aware of the most appropriate screening tools used in their particular practice settings.

Collaborative Interventions

When IPV is suspected or identified, the priority intervention is to protect the individual from further abuse. It is the legal and ethical duty of nurses and all health professionals to report suspected abuse. Each state has specific laws for mandatory reporting of child abuse and other forms of violence; as such, nurses must familiarize themselves with all related requirements. When the victim is a child or a compromised older adult individual, referrals are made to the state agency child or human welfare departments for a formal investigation; based on their findings, the child or older adult may be left in the home or removed and placed in another setting.

Emotional support and appropriate referrals are also needed for the patient and family. Survivors of both rape and other forms of intimate partner violence often blame themselves for behaving in a way that encouraged the perpetrator. It is important to remember, and immediately and repeatedly reinforce, that the victim is never to blame for the actions of a perpetrator. A focus on minimizing the physiological consequences is needed, particularly helping those who have consequently suffered emotionally, to experience and establish positive relationships. Education and referral for counseling are frequently needed to ensure adaptive coping strategies. Nurses can help patients and families gain access to available appropriate community agencies and support groups. Common resources are presented in Box 35.4.

INTERRELATED CONCEPTS

Many of the short-term and long-term consequences of IPV could conceivably involve almost all health and illness concepts presented in this book, depending on the physical and psychological effects of the violence. Fig. 35.3 features some of the most important interrelationships to consider. Common psychological consequences of IPV include **Anxiety**, **Mood and Affect**, and **Stress and Coping**. Individuals who experience IPV rely on coping strategies as part of the response to such events. Interrelationships with several Professional Nursing Concepts also are important to note. Nurses have a legal (**Health Care Law**) and ethical (**Ethics**) obligation to report abuses. Because of widespread prevalence, **Health Policy** initiatives have resulted in national strategies to address IPV.

CLINICAL EXEMPLARS

There are many examples of IPV, many of which have been described throughout this concept presentation. It is important to remember that IPV occurs across the lifespan and it can happen to any individual. Box 35.5 presents common exemplars of IPV.

Featured Exemplars

Child Abuse

It is difficult to know the actual figures of child maltreatment. Much of it is unreported. In their 2020 report, the WHO estimated that nearly 3 in 4 children (or 300 million children) aged 2 to 4 years regularly suffer physical punishment and/or psychological violence at the hands of parents and caregivers.[66] In 2019, Child Protective Services (CPS) agencies received an estimated 4.4 million referrals involving the alleged maltreatment of approximately 7.9 million children. Of these referrals,

BOX 35.4 Resources for Interpersonal Violence

The National Domestic Violence Hotline
1-800-799-7233 or TTY 1-800-787-3224
http://www.thehotline.org
National Child Abuse Hotline/Childhelp
1-800-4-A-CHILD (1-800-422-4453)
www.childhelp.org
Rape, Abuse and Incest National Network
1-800-656-HOPE (4673)
https://www.rainn.org
National Sexual Assault Hotline and Chat
https://www.rainn.org/
LGBTQI Domestic Violence
Lesbian, Gay, Bisexual and Transgender National Hotline:
1-888-843-4564
Resources:
https://www.thehotline.org/resources/abuse-in-lgbtq-communities/
Gay Men's Domestic Violence Project's 24-Hour Hotline
1-800-832-1901
Adult Protective Services and Elder Abuse Hotline
Interactive map by State for reporting and resources:
https://www.napsa-now.org/get-help/help-in-your-area/

Fig. 35.3 Interpersonal Violence and Interrelated Concepts.

BOX 35.5 EXEMPLARS OF INTERPERSONAL VIOLENCE

Child Abuse
- Physical abuse
- Sexual abuse
- Emotional abuse
- Neglect
- Bullying
- Youth violence

Intimate Partner Violence
- Physical violence
- Sexual violence
- Emotional abuse

Elder Abuse
- Physical abuse
- Sexual abuse
- Emotional abuse
- Neglect
- Abandonment
- Financial abuse

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

approximately 2.4 million reports received either an investigation or alternative response.[67] Overall, an estimated 1840 children died because of abuse or neglect in 2019. Just over 70% of the children who died were younger than 3 years old, and nearly 80% of child fatalities involved parents acting alone, together, or with other individuals.

Neglect

Neglect is a form of abuse where the perpetrator, who is responsible for caring for someone who is unable to care for themselves, fails to do so. It can be a result of carelessness, indifference, or unwillingness and abuse. The neglect occurs through omission of necessary care (i.e., neglect or purposeful withholding of necessary care and meeting of basic human needs). Common types of neglect include physical and emotional neglect, as well as abandonment, sexual abuse, and financial abuse, neglect, and exploitation.[31,42]

Bullying

Childhood bullying can have serious implications for bullies and their targets. Bullying involves a pattern of repeated aggression, a deliberate intent to harm or disturb a victim despite the victim's apparent distress, and a real or perceived imbalance of power. Bullying can lead to serious academic, social, emotional, and legal problems. Most bullying occurs during childhood and adolescent years, with a peak among middle school children. In most cases, bullying occurs while at school, but this can also occur outside the school grounds, such as on the way to and from school or during extramural youth activities.[68] In 2019, approximately 20% of students ages 12 to 18 years experienced bullying nationwide.[69]

Youth Violence

Youth violence is a significant public health problem that affects thousands of young people each day, and, in turn, their families, schools, and communities. It increases the costs of health, welfare and criminal justice services; reduces productivity; and can decrease property values. Youth violence can take different forms, including fights, bullying, threats with weapons, and gang-related violence. A young person can be involved with youth violence as a victim, offender, or witness. Worldwide, an estimated 200,000 homicides occur among youth 10 to 29 years of age each year, making it the fourth leading cause of death for people in this age group.[70] Youth homicide and nonfatal violence, including a disproportionate burden on ethnic and racial minority youth, not only contribute greatly to the global burden of premature death, injury, and disability but also have a serious, often lifelong effect on a person's psychological and social functioning.[70]

Intimate Partner Violence

Intimate partner violence occurs across all social, economic, educational, and professional settings. Physical or sexual abuse may be readily observed in some instances or well hidden at other times; the emotional components of verbal, economic, and isolation abuse are often difficult to assess. An estimated 1 in 4 women and nearly 1 in 10 men have experienced violence and/or stalking by an intimate partner during their lifetimes.[71] In the United States, the prevalence of intimate partner violence in women in minority populations is higher than that in White women, with Hispanic women reporting a greater frequency of rape and Native American women reporting more violent abuse.[4]

Sexual Violence

Sexual violence occurs across the life span. Men, women, and children of all ages experience sexual violence. Nationwide, 81% of women and 43% of men reported experiencing some form of sexual harassment and/or assault in their lifetime.[72] In 2019, 9.3% of children had suffered sexual abuse.[67] Sex trafficking, one form of sexual violence commonly experienced by younger victims, is the recruitment, harboring, transportation, provision, or obtaining of a person for the purposes of a commercial sex act. Many older adults are also subjected to sexual abuse within their own homes, nursing homes, or community. The signs and symptoms of sexual abuse to older adults include, but are not limited to, bruises around the breasts or genital area; unexplained sextually transmitted infections; unexplained vaginal or anal bleeding; torn, stained, or bloody underclothing; and an older adult's report of being sexually assaulted or raped.[73]

Elder Abuse

Elder abuse is a nationwide issue that affects millions of people each year. The number of older adults living in the United States is large and growing; by 2050, the total number of adults ages 65 years and older is projected to rise to an estimated 85.7 million—roughly 20% of the overall U.S. population.[74] Addressing abuse to older adults is a challenge because the root causes vary with each case, and the full extent of the problem is still unknown. Abuse to older adults often goes unreported. In one study, 1 out of nearly 24 such cases were actually reported to authorities. As the world's population ages, the number of elder abuse cases is projected to increase dramatically. By 2050, it is expected that 320 million older adults will have suffered abuse.[75]

CASE STUDY

From Cameron Whitman/iStock/Thinkstock.

Case Presentation

Amanda Soto, a 22-year-old female, presents to an outpatient clinic with a chief complaint of headaches and problems sleeping. Yvonne Sanchez, the nurse at the clinic, remembers seeing Amanda in the clinic not long ago. She reviews Amanda's medical record before seeing her and notes that Amanda has been in the clinic four times in the past 5 months, each time with vague symptoms, and each time she was sent home with a nonspecific diagnosis. The nurse reviews her social history and sees that Amanda is married and has two children, ages 2 and 4 years, and works as a receptionist. Amanda has no medical conditions and takes no medications other than oral contraceptives.

When Yvonne enters the examination room, she observes Amanda sitting on the examination table with her knees held tightly against her torso and rocking back and forth. Yvonne asks Amanda to describe the symptoms she has been experiencing. Amanda states her headaches have been occurring off and on for a while, and she describes them as "intense" and often keeping her awake at night. As she talks, Yvonne notes a flat affect in Amanda's communication pattern. She also notices bruising to her neck, just above the clavicle, and on her upper arms. When Yvonne asks Amanda the last time she experienced the headache, she tells Yvonne she cannot remember exactly, but perhaps 1 or 2 weeks ago.

Yvonne suspects Amanda may be experiencing violence. She pulls out the Partner Violence Screening tool, available at her office, and asks Amanda the following three questions:

1. Have you been hit, kicked, punched, or otherwise hurt by someone within the past year? If so, by whom?
2. Do you feel safe in your current relationship?
3. Is there a partner from a previous relationship who is making you feel unsafe now?

Amanda begins to cry and acknowledges she is in trouble. She states her husband has a drinking problem, and every couple of weeks he gets drunk and becomes violent. He always feels badly after he becomes sober, but she has become frightened at what he will do to her or the children. She states that he has never hurt the children, but they see him regularly hit her. Amanda tells Yvonne she has contemplated leaving, but she does not think she can. She explains that her husband controls all of the money, and she has nowhere to go. She is sure she does not earn enough money to support herself and her children, and she is worried that he will track her down anyway. Amanda feels completely trapped and unable to remove herself from the situation.

Case Analysis Questions

1. Which types of IPV does this case exemplify?
2. What were the clues that led Yvonne to suspect IPV?
3. What should Yvonne do as a next step?

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SECTION III

Professional Nursing and Health Care Concepts

PERSONAL DEVELOPMENT

36 *Professional Identity*
37 *Well-Being and Resilience*
38 *Leadership*
39 *Evidence*
40 *Clinical Judgment*

HOLISTIC CARE

41 *Person-Centered Care*
42 *Ethics*
43 *Diversity, Equity, and Inclusion*

CARE COMPETENCIES

44 *Communication*
45 *Collaboration*
46 *Safety*
47 *Health Care Quality*
48 *Technology and Informatics*
49 *Health Disparities and Health Equity*
50 *Care Coordination*
51 *Health Promotion*
52 *Patient Education*
53 *Palliative Care*
54 *Population Health*
55 *Public Health Emergencies*

HEALTH CARE INFRASTRUCTURE

56 *Spheres of Practice*
57 *Health Systems*
58 *Health Care Economics*
59 *Health Policy*
60 *Health Care Law*

The delivery of safe and effective health care is extremely complex. As the largest group of healthcare professionals, nurses play an especially important role in healthcare delivery. Healthcare delivery represents many critical elements that collectively describe the essence of professional nursing practice. The concepts within Section III relate to these ideas and are closely associated with professional attributes and behaviors desired of all healthcare providers. The Professional Nursing and Health Care Concepts section represents 25 concepts organized within four overarching themes. Unlike those of the preceding section (Health and Illness Concepts), these are concepts associated with professional comportment—meaning the identity of nursing as a profession.

The first theme is **Personal Development**. Concepts within this theme represent roles nurses play in healthcare delivery and the attributes or characteristics desired of professional nurses; these are the behaviors nurses incorporate into all patient care encounters. Specific concepts represented include *Professional Identity*, *Well-Being and Resilience*, *Leadership*, *Evidence*, and *Clinical Judgment*.

The second theme is **Holistic Care**. The three concepts within this theme (*Person-Centered Care*, *Ethics*, and *Diversity, Equity, and Inclusion*) are foundational to nursing practice that optimally supports and advocates for patients, families, and communities.

The third theme is **Care Competencies**. The term *competency* refers to being competent or well qualified to complete a skill or task. In the context of nursing and health care, competencies are identified knowledge, skills, and attitudes deemed important for safe and effective care. Specific concepts include *Communication, Collaboration, Safety, Healthcare Quality, Technology and Informatics, Health Disparities and Health Equity, Care Coordination, Health Promotion, Patient Education, Palliative Care, Population Health*, and *Public Health Emergencies.* Although the concepts featured within this theme are not intended to be comprehensive of all competencies, some of the most common to all nurses, regardless of area of practice, are included.

The final theme is **Healthcare Infrastructure**. *Spheres of Practice*, *Health Systems, Healthcare Economics, Health Policy,* and *Healthcare Law* represent specific concepts within this theme. These concepts influence healthcare delivery and the practice of nursing.

CONCEPT 36

Professional Identity

Nelda Godfrey and Elizabeth Young

Professional identity is an attribute of the nurse professional that is initially acquired during one's nursing education. As a novice member of a professional group, the student nurse uses knowledge, experience, and reflections to embrace the characteristics, norms, and values of the nursing discipline and begins to think, act, and feel like a nurse.[1] The process for gaining this understanding is called professional identity formation,[2] which, together with professional identity, encompasses what is sometimes referred to as professionalism. Professional identity is formed as a person transitions from layperson to a nurse professional,[3] and it is fostered throughout the nurse's career as one's professional identity is challenged and matures through professional experiences.[4]

DEFINITION

Grounded in earlier work from our colleagues in medicine,[2,5] professional identity in nursing is defined as "*a sense of oneself, and in relation to others, that is influenced by characteristics, norms, and values of the nursing discipline, resulting in an individual thinking, acting, and feeling like a nurse.*"[6,7] Professional identity is situated within the larger notions of identity and personal identity. It is intentionally smaller and more specific than the overall concept of identity[6] (Fig. 36.1).

SCOPE

Novice professionals in any discipline form a sense of professional identity as their education begins. Professional identity is developed in many ways, although real and simulated experiences, reflection, and role modeling by professional colleagues seem to be the most meaningful strategies.[8–11] Nursing education incorporates many, if not most, of these strategies within clinical education, which represents highly valued experiential learning under the guidance of a preceptor or faculty member.[12,13] These experiences progress to clinical immersion experiences in which a student works the shift of a nurse in practice to better learn the knowledge, skills, and attitudes needed in that practice environment.[3]

Today, *professional identity* and *professional identity formation* are replacing nursing terminology such as *professional role* and *professionalism* in nursing and other health disciplines[1,2,14] because of an evolution of thought about internalizing and demonstrating professional norms in the professional learning community. The Tree of Impact (Fig. 36.2) illustrates factors that contribute to professional identity formation in nursing. Establishing professional identity as an educational objective and aspirational goal is now an expectation in health professions education such as veterinary medicine, pharmacy, and medicine.[2,12,14,15]

ATTRIBUTES AND CRITERIA

The attributes of professional identity are mirrored in the four iteratively determined, scientifically based domains of professional identity in nursing. The four domains are (1) values and ethics, (2) knowledge, (3) nurse as leader, and (4) professional comportment.

Values and Ethics

According to the American Nurses Association (ANA) Code of Ethics, values are core beliefs that guide and motivate actions and attitudes.[16] Values, beliefs, and ethics are the characteristics most frequently cited as defining a profession.[17] Caring is often a value attributed to nursing by both nurses and the general public. Other values such as integrity and empathy are also characteristics attributed to nurses; that nurses have been ranked as the most honest and ethical profession since 2002 affirms this.[18] These values can be demonstrated by returning to check on a patient at the time one said they would (integrity), giving pain medication prior to ambulating a patient who just had surgery (caring), and sitting in silence with a patient after a cancer diagnosis, as words cannot describe the feelings (empathy). These actions reflect what a nurse does to provide the highest quality of care while still maintaining one's personal integrity and reflecting the profession's altruistic values.

Ethics is the branch of philosophy that deals with morality or personal values and with character or conduct of both individuals or groups.[16] The ANA Code of Ethics states that the nurse's primary commitment is to the patient and should practice with respect for the inherent dignity of every person. These standards

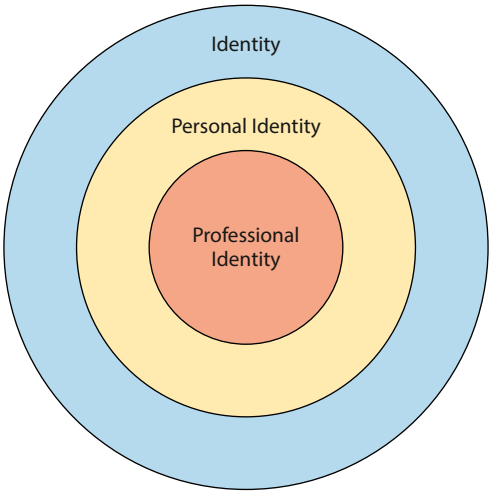

Fig. 36.1 The Concept of Professional Identity as a Subset of Identity and Personal Identity.

of conduct apply to every nurse in all settings and, thus, guide nursing practice.

Knowledge

Knowledge is the "*analysis and application of information derived from nursing and other disciplines, experiences, critical reflection and scientific discovery.*"[7] Think of all the knowledge and skill required to complete routine interventions. As one example, flushing an intravenous (IV) line with saline requires aseptic technique and ensuring no air bubbles enter the line. Concurrently, the IV site is assessed for signs of infiltration or phlebitis, pain, or difficulty flushing, thus reflecting clinical judgment regarding IV care, the physiology of subcutaneous tissue and the vascular system, and knowledge of pharmacology. If the skin around the IV site is cold, swollen, and painful, the nurse recognizes cues and patterns that the IV needs to be removed promptly. This represents ethical awareness so the patient is not harmed. The date and time on the IV line is also checked to ensure that it has not expired, based on the best evidence regarding the safest duration of indwelling IV lines. Although there may be overlap with other disciplines, nursing knowledge is unique to nursing and guides how nurses think, act, and feel.

Nurse as Leader

Nurses fulfill the definition of a leader by making a difference through a shared vision for quality care with patients, families, and communities.[19] The ANA Code of Ethics states, "*The nurse promotes, advocates for, and protects the rights, health, and safety of the patient.*"[16] Advocacy has long been a hallmark of nursing, and exemplifies nurses acting as leaders. For example, in the early months of the COVID-19 pandemic, nurses were hailed as healthcare heroes for their expert caring and their advocacy for patients and families. The nurse-as-leader attribute inspires a shared vision and demonstrates excellence in one's nursing practice.[7] This is echoed in Magnet Recognition Program materials[20] where excellence and a commitment to strive for excellence is a core value. The nurse as leader is further actualized when nurses can effectively negotiate conflict and communicate effectively regarding patient care needs or concerns both with other members of the healthcare team and through policy.

Professional Comportment

Professional comportment relates to behaviors that are demonstrated through words, actions, and presence.[7] Thus, professional comportment is demonstrated when a nurse is respectful, engaged, and collaborative with patients, families, communities, and colleagues both in nursing and other professions. Provision 4 of the ANA Code of Ethics states nurses "*must take actions consistent with the obligation to promote health and to provide optimal care.*"[16] Nurses use their unique clinical judgment to confidently communicate safety concerns to other members of the healthcare team. Professional behaviors are also evident when nurses are engaged in their own practice by true presence with patients and families and are self-aware of their own physical, emotional, and social needs. With high rates of burnout and nurses leaving the profession from stresses caused by the COVID-19 pandemic and staffing shortages, resilience is seen as an indicator of professional comportment.

THEORETICAL LINKS

Professional identity formation occurs both at the level of the individual and at the level of the professional group. Formation includes intentional socialization and participation in the work of the community.[21] Learners shift from experiencing the environment as a layperson to that of a professional through the process of professional identity formation.[3] Furthermore, identity formation is superimposed upon the learner's normal developmental process.[2]

Marcia's Identity Status Theory was one of the first to examine identity issues that first arise in late adolescence and to draw conclusions about what is observed during this time of change.[22] Adolescence is typically when society and adolescents expect beliefs and vision for future career goals to start to form. For the adolescent and growing young adult, this is a time of both exploration and commitment, and manifested through four identity statuses: identity diffusion, identity foreclosure, identity moratorium, and identity achieved. *Identity diffusion* is characterized by a lack of interest in commitment, and even in exploration. The catchphrase for this would be "whatever seems good at the moment." The second identity status is *identity foreclosure,* in which the person keeps talking about changing those around them and, conspicuously, not about making change personally. *Identity moratorium,* the third identity status, is characterized by overwhelming anxiety that is "hard to sit through" with someone. The fourth status, *identity achieved,* means that the person is reasonably self-aware, has a sense of self, and can manage overwhelming anxiety should it occur.[22]

Crigger and Godfrey's Stairstep Model of Professional Transformation visually represents the dynamism in professional identity formation.[23] Inclusive of the three main ethical traditions, this model illustrates the transformational nature of nursing with the reality of slips and progress (flourishing) that occur throughout one's career (Fig. 36.3). Lastly, progress toward the ideal reflects professional identity formation in that it is a function of individual and group efforts, with influences from many experiences.

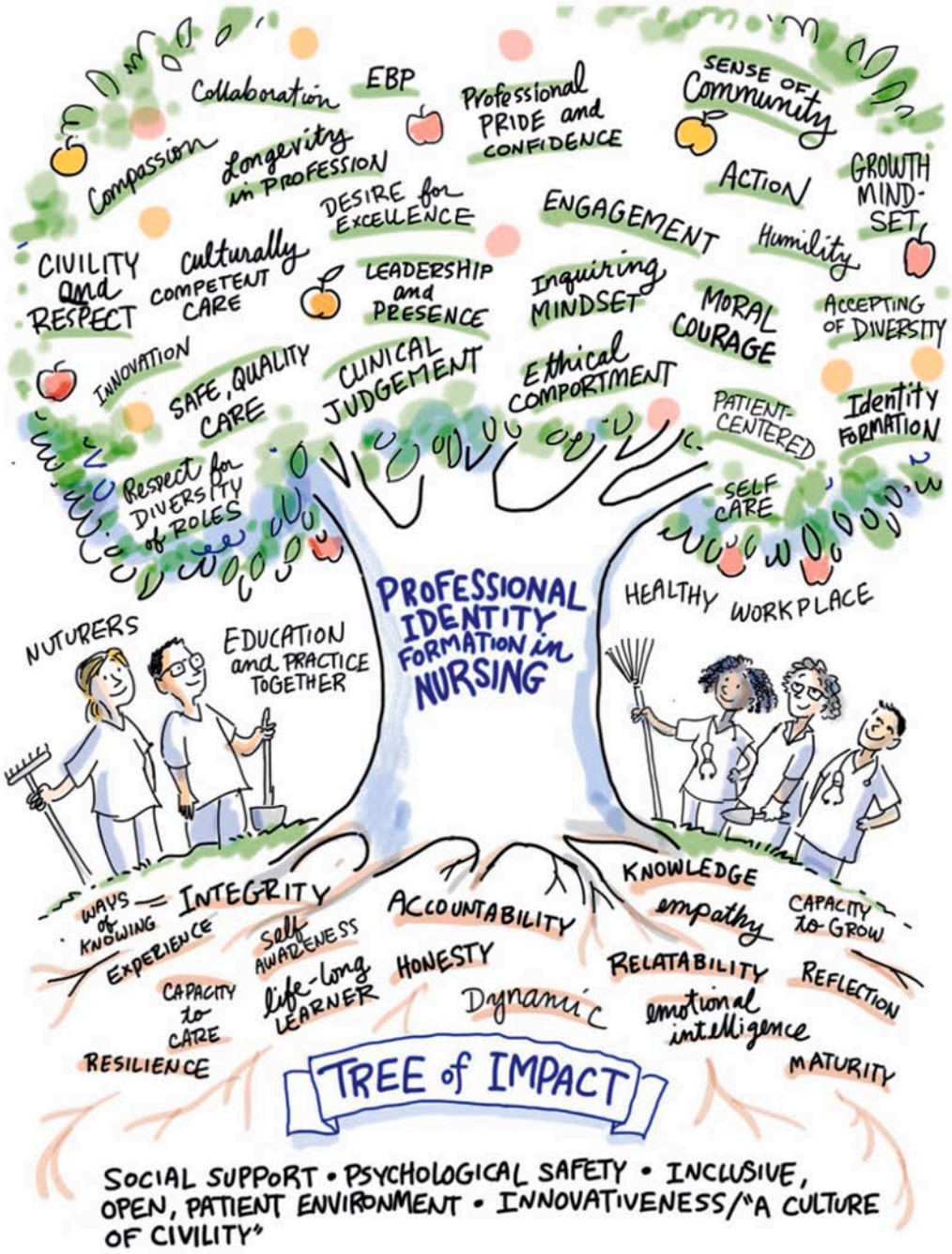

Fig. 36.2 Tree of Impact for Professional Identity in Nursing. From the International Society for Professional Identity in Nursing. Used with permission.

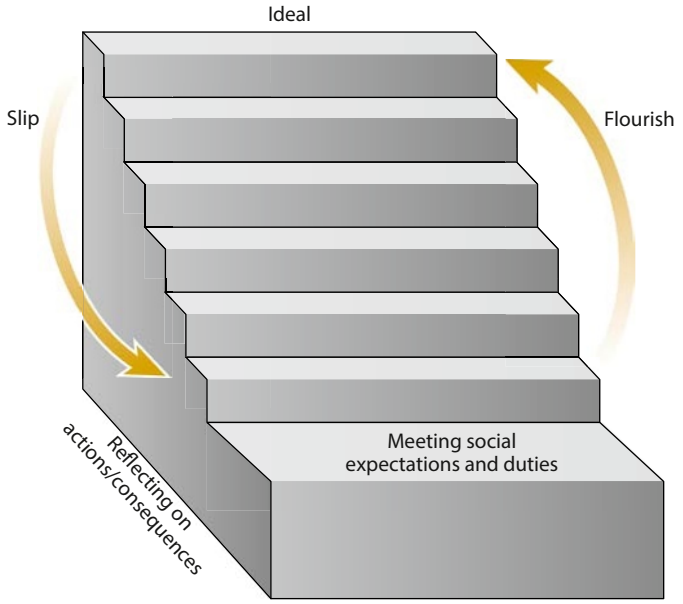

Fig. 36.3 Stairstep Model of Professional Transformation. (Redrawn from Crigger, N., & Godfrey, N. [2011]. *The making of nurse professionals: A transformational, ethical approach*. Burlington, MA: Jones & Bartlett Learning, www.jblearning.com. Reprinted with permission.)

CORE COMPETENCIES

Professional Identity

- Demonstrate one's professional identity in nursing through values and ethics, knowledge, nurse as leader, and professional comportment, reflecting nursing's core values and mission to society.
- Actively engage in one's nursing practice with intentional presence, compassionate caring, empathy, advocacy, and cultural sensitivity.
- Demonstrate accountability to the individual, society, and the profession.
- Integrate diversity, equity, and inclusion as core to one's professional identity.

Adapted from American Association of Colleges of Nursing. (2021). *The essentials: Core competencies for professional nursing education.* https://www.aacnnursing.org/Portals/42/AcademicNursing/pdf/Essentials-2021.pdf and Landis, T., Godfrey, N., Barbosa-Leiker, C., et al. (2022). National Study of nursing faculty and administrators' perceptions of professional identity in nursing. *Nurse Educator,* 47(1), 13–18. https://doi.org/10.1097/NNE.0000000000001063

CONTEXT TO NURSING AND HEALTH CARE

Four illustrations of the connection between professional identity and nursing and health care follow: (1) forming and fostering professional identity; (2) accelerating diversity, equity, and inclusion through one's professional identity in nursing; (3) using professional identity to respond to challenges of the COVID-19 pandemic; and (4) using strategies to build professional identity in nursing.

Forming and Fostering Professional Identity

There are two stages of professional identity formation in nursing: the *forming stage,* when the lay person is introduced to the profession; and the *fostering stage,* when the nurse has initial knowledge about professional identity and faces the real-life challenges of nursing practice after initial nursing licensure. The forming stage is relatively straight forward, with the introduction of terms, definitions, domains, key elements, and competencies. The definition of the concept Professional Identity in nursing and the four attributes, values and ethics, knowledge, nurse as leader, and professional comportment (see the section *Attributes and Criteria*), are examples of knowledge gained in the forming stage. One of the competencies in the 2021 *Essentials: Core Competencies for Professional Nursing Practice* is Competency 9.5: Demonstrate one's professional identity of nursing.[12] For the beginning student, understanding the definitions, domains, case studies, participating in class discussions and written assignments, and gaining familiarity with the language of professional identity in nursing help achieve this competency.

The second stage, fostering professional identity, occurs after the learner's initial language and knowledge acquisition. If the student grasps the what and how of professional identity early in prelicensure education, the work of fostering can occur before entering the professional work world. For most, however, the act of fostering professional identity will occur once the nurse is licensed and functioning as a professional nurse. Because the language of professional identity in nursing is relatively new, the new professional nurse may be a source of knowledge and language for colleagues already in practice. Fostering professional identity in nursing is a rich, lifelong professional pursuit.

Accelerating Diversity, Equity and Inclusion Through One's Professional Identity in Nursing

Another competency in the 2021 *Essentials: Core Competencies for Professional Nursing Practice* is Competency 9.6: Integrate diversity, equity and inclusion in one's professional identity of nursing.[12] Given the critical need for our society and our world to embrace diversity, equity, and inclusion in meaningful ways and help all humans feel valued, a clear and noticeable expression of valuing diversity, equity and inclusion should be evident in all nursing encounters. The ANA *Code of Ethics for Nurses* highlights the central nursing value of respect for persons.[16] Nursing students and nurses in practice can and should embody a profound respect for diversity, equity, and inclusion, resulting in an individual thinking, acting, and feeling like a nurse.

Using Professional Identity to Respond to Challenges of the COVID-19 Pandemic

In the early stages of the COVID-19 pandemic, nurses reported positive changes in professional identity, thought to be related to recognition of nurses during this time.[24,25] With the ongoing challenges of the COVID-19 pandemic, however, there have been increased staffing and burnout issues from the stress of fewer frontline nurses as a result of sickness or leaving the profession, high patient volumes, and caring for critically ill patients. Although the systems issues (i.e. short-staffing) may be out of one's control, professional identity is still important to promote flourishing in one's nursing practice. To review, the definition of professional identity is "*a sense of oneself, and in relationship with others, that is influenced by characteristics, norms, and values of the nursing discipline, resulting in an individual thinking, acting, and feeling like a nurse.*"[6,7] For a nurse's professional identity to flourish, two things are needed: a sense of self that aligns with and embodies the nursing discipline[1,6] and a well-developed sense of community of practice.[26,27]

For a nurse to have a sense of self that aligns with the nursing discipline, they should use the four domains of values and ethics, knowledge, nurse as leader, and professional comportment as signposts to self-direct. Reflecting on these signposts can help nurses to think about the unique contributions the nursing discipline has

made throughout the pandemic to patients, families, and communities in developing their sense of who they are as a nurse. If they experience moral distress, they can use the nursing values of integrity, caring, and empathy to guide decision making. If they are assessing hospital-acquired pressure injuries on a critically ill patient, they can apply nursing knowledge and expertise of skin integrity and wound treatment to provide the highest quality of care. If they work with a discharge plan that does not seem appropriate, they can act as nurse as leader in advocating for the patient. If they note a lack of respect for persons, either in general or specifically in honoring other humans through diversity, equity, and inclusion, they can look at professional comportment as a guide, and perhaps add other signposts as they discern the path to take. Most importantly, the professional identity in nursing structure of an overarching definition and four evidence-based domains enables the nurse to take more responsibility for one's own practice, weighing all factors and taking action.

Nursing has often been said to be a team sport, which reflects the second part of the definition, "in relationship with others." Nursing programs can more intentionally build and foster a community of practice while the student is a learner. In the clinical setting, nurses can support one another by being a listening ear after a patient passes, assisting one another with tracheostomy care, and being available to discuss laboratory findings when a clinical picture is unclear. These actions help build one's own professional identity and support a sense of community and teamwork.[7,27]

Strategies to Build Professional Identity in Nursing

As mentioned previously, the development of professional nursing occurs over time and as a result of reflecting on multiple experiences. Below are several strategies that facilitate the development of a strong, contemporary professional identity in nursing.

- *Seek to hear expectations clearly.* Most nursing education programs are highly complex and may seem difficult to understand. Listen carefully to expectations and advice for success.
- *Value debriefing and feedback from role models.* Studies have shown that role modeling is critically important in learning a profession. As an example, one study reported the most important component of the educational process as the "supportive yet challenging relationship" the learner has with the faculty member or mentor.[28] Recognize that these relationships are not only important in the future but are also a valuable part of the student's learning in the nursing program in the present.
- *Engage in reflection.* Reflection has been increasingly shown to positively influence student learning.[29] Sometimes the reflection will be guided, through assignments in and outside of class; other times, reflection is expected to be spontaneous, such as in post conferences after clinical learning experiences. Reflection is a time to internalize what is occurring with the patient and family and also the experiences the student nurse sees in organizational settings.
- *Understand your own responsibilities for learning and be accountable for them.* People's beliefs in their ability to influence events that affect their lives is known as self-efficacy.[30] Your ability to recognize your potential to grow and flourish will help propel you to greater personal and professional levels of self-efficacy.
- *Build relationships with those around you.* Building relationships is about understanding the importance of engaging in the learning environment and following through so that these relationships become stronger and more meaningful. Relationship building and engaging with others is an important part of identity formation. An integrative review of professional identity formation in higher education reported that students need authentic experiences on which to reflect and active engagement that employs collaborative learning from practice environments.[31]
- *Develop personal self-care habits.* The ANA Code of Ethics addresses the importance of nurses' self-care as part of nurses' ethical code.[16] Attention to self-care is especially important given the stress and burnout circumstances of the COVID-19 pandemic and overall nursing shortage. Caring for oneself is a key component in developing a strong professional identity in any field.
- *Embrace any opportunity for experiences with patients:* Holden et al. report that both real and simulated unique experiences with patients are valuable in forming professional identity.[32]

INTERRELATED CONCEPTS

The concept of professional identity is interrelated with four professional nursing and healthcare concepts (Fig. 36.4). **Clinical Judgment** depends on a deep and meaningful understanding of the professional identity of the nurse, incorporating health and illness concepts along with the norms and values that characterize the nurse as a designer, manager, and coordinator of care and as a member of a profession.[1,33] Principles of **Leadership** and **Ethics** govern the nurse's social contract with patients and families in his or her care, affirming that advocacy for the patient and family is a primary consideration for all decisions made within the healthcare environment.[34] **Communication** is fundamental to the nursing discipline and as such constitutes a substantial part of what actually happens in moment-to-moment nursing practice.

CLINICAL EXEMPLARS

There are many examples of professional identity in nursing practice. Box 36.1 presents some of the most common situations or examples seen in clinical practice, including language choice, interaction, being "present," interacting in a professional way with the family, and acting as an agent for healing. It is beyond the scope of this text to provide details on all exemplars, but some are featured here.

Featured Exemplars

Integrity

Considered a fundamental character trait, integrity is evident in nearly every nursing action. If a nurse has integrity, they do what they say they will do and act with consistency and purpose. Integrity is often the basis for trust—for families and patients and for coworkers. A breach of integrity can erode one's trust in another, making this exemplar a critical consideration when providing care to vulnerable patients and their families.[23]

Compassion

Not to be confused with sympathy or empathy, compassion is feeling what another is feeling and responding to it with the intent of doing something to help.[35] Caring and the ethic of care are intricately intertwined with the notion of compassion, and together they constitute a sense of response and accompanying action with those in need.[23]

Fig. 36.4 Professional Identity and Interrelated Concepts.

BOX 36.1 EXEMPLARS OF PROFESSIONAL IDENTITY

Integrity
- Following through with pain medication
- Calling the physician when the patient asks you to
- Checking the Code Cart by the prescribed time
- Giving medications within the 30-min window

Compassion
- Taking time to talk with a troubled family member
- Responding to a patient's call light with genuine interest
- Comforting a colleague who has just had a death in his or her family
- Using eye contact to apologize for a misstep with a colleague

Courage
- Speaking up when a colleague did not wash his or her hands before entering a patient room
- Conveying the details of the conversation a dying patient had with you to other members of the healthcare team
- Taking practice issues to the practice council to positively change practice on your nursing unit
- Speaking out about bullying occurring on the nursing unit

Humility
- Realistically viewing family members' ability to cope with a crisis
- Being nonjudgmental as staff deal with a unit-based crisis
- Clearly identifying your part in an error and not accepting more blame than is yours
- Seeing the larger picture when issues arise with patients, families, and coworkers

Advocacy
- Sharing with the patient's permission, with family members the details of a conversation you had with their loved one previously in the day
- Listening carefully to patient's wishes and working with the hospital to do what you can to make that happen
- With the patient's permission, communicating with the family about their loved one's surgery schedule, course of events, and expected finish time
- Working to get prescriptions filled before an individual experiencing homelessness leaves the hospital

Human Flourishing
- Encouraging patients and colleagues in their difficult times
- Seeking additional resources for patients with limited discharge planning issues
- Encouraging coworkers to seek employee assistance options for difficulties they are having
- Creating a positive, encouraging environment for patients and families

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Courage

In the context of professional identity, courage has two meanings: (1) to affect change and (2) to stand in opposition for moral rightness.[23] Courage can also be categorized as physical or moral.[23] The nurse who cared for patients with COVID-19 even with risk of exposure to herself demonstrated physical courage. The nurse who escalated a patient care situation by moving up the chain of command to consult other members of the medical staff exhibited moral courage.

Humility

Sometimes misunderstood, humility is "*like a buoy that rides the waves of disappointments and accomplishments*."[23] When a person demonstrates humility, he or she views the world with equanimity, taking neither an overstated amount of credit nor blame for a particular situation.[23] Such an approach encourages a realistic view of circumstances, events, and the actions of others.

Advocacy

In situations in which nurse professionals employ advocacy, nurses and patients alike view this action as the "last line of defense" on behalf of the patient. This idea of the nurse as patient advocate is an example of a "signature image" of professional identity among nursing and other professions.[34]

Human Flourishing

A transformational or human flourishing perspective is necessary for professional identity to move past the initial phases of formation. Not all professionals move to the expert stage of development; some opt to be experienced nonexperts who choose not to deepen their understanding of their profession.[34] Flourishing is an important component of both forming and fostering professional identity.[23] Nurses who are burned out and not flourishing are easily recognized by a lack of engagement with patients and the profession's public purpose. As nurses and fellow humans, we have a duty to do what is possible to foster outcomes that lead to human flourishing.

CASE STUDY

From Huntstock/Thinkstock

Case Presentation

Jane King is a 22-year-old female who has just begun her undergraduate nursing program. She is in her first clinical experience, and although she has been taught about giving bed baths, she is not sure that she is at all comfortable doing so. Her patient today is a 78-year-old male patient with renal failure and limited mobility. Within her 8-hour assignment, Jane will need to complete all of her patient's personal care.

Jane has cared for young children in babysitting jobs since she was 11 years old but has no experience caring for adults. She is particularly concerned about perineal care. Jane has had instruction—but what about the actual experience of doing perineal care? Because this is her first semester in her nursing program, she has not had much time to "feel, think, and act" like a nurse professional. However, this patient is in a difficult situation in which he needs her care. This is all new to Jane, and she does not know what to do.

Case Analysis Questions

1. Consider the attributes of professional identity. How do these apply to Jane's situation?
2. How could role modeling from the instructor or another nurse be helpful to Jane?

CASE STUDY

From michaeljung/iStock/Thinkstock

Case Presentation

Jackie Wilson is a junior nursing student who was assigned on Tuesday to her first day of operating room (OR) observation. The OR staff was excited that Jackie was able to see a liver transplant performed. Later that evening, Jackie shared with her family how interesting it was to see the transplant and to see the staff work so well together and function as a high-performing team. She also shared many details about the surgery and the patient, because, of course, the staff had been sharing these details with her.

Three days later, the academic health center released a press briefing to media outlets in the region reporting that the hospital had reached a milestone with a liver transplant performed on that Tuesday. That morning at work, Jackie's father told his colleagues that his daughter had been in the OR for that liver transplant, and he proceeded to communicate many of the details that Jackie had shared at the family dinner table.

Case Analysis Questions

1. What lapse in professional behavior occurred?
2. What strategies would be useful to help Jackie's understanding of professional identity?

CASE STUDY

Case Presentation

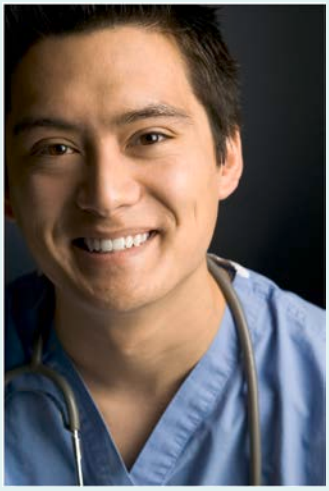
Paul Choi is a senior nursing student in his obstetrics clinical rotation on the mother/baby unit. He is assigned to work with a mother and 1-day-old baby boy. Paul notices on the patient's chart that the primary language the patient speaks is Arabic. During report, the off-going nurse comments on how "needy" the patient was last night in continually pushing the call bell, struggling to access a translator, and continually having multiple visitors walk in, even after informing the patient of the "one person per patient" visiting policy on the unit. The oncoming nurse, Leah (with whom Paul is assigned to work), rolls her eyes and sarcastically states, "Great. Now I have to figure out how to access the translator during an already busy day."

Paul and Leah walk into the patient's room and begin their shift assessment without a translator. Paul observes that the patient appears apprehensive and she tries to pull the covers up during the assessment. Paul is concerned about communication barriers because of the language difference. He also wonders if there are cultural reasons the patient seems uncomfortable with the assessment being performed.

Case Analysis Questions

1. How can Paul apply the professional identity competencies in working with his assigned patients?
2. What does ethical behavior and integration of diversity, equity, and inclusion look like in this situation for both Paul and Leah?

CASE STUDY



Case Presentation

Andrew Garcia, a senior undergraduate nursing student, is assigned to work with Betsy, an experienced registered nurse. Andrew introduces himself to Betsy as the team is getting ready for the patient report. She glances at him, says hello, and then proceeds with report.

Throughout the morning, Betsy moves from patient to patient, conducting assessments, passing medications, and performing other tasks without explaining anything to Andrew. He notices that although Betsy interacts with patients and answers their questions, she does not engage in therapeutic communication.

After a few hours, Andrew feels frustrated and angry that he has not been able to engage in care with his assigned patients and that the nurse he is working with doesn't want anything to do with him.

Case Analysis Questions

1. What can Andrew do to form his professional identity even if the nurse he is working with does not seem receptive to working with a student today?
2. How could the attributes of professional identity be exemplified by Andrew in this situation?

From Photodisc/Thinkstock.

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CONCEPT 37

Well-Being and Resilience

Lee Anne Walmsley, Janie Heath, and Janette Carver

If you ask nursing students, "Why are you interested in becoming a nurse?" a common response is, "Because I really care about people." There is no doubt the nursing profession is comprised of caring, loving, and compassionate people. So why is the profession losing so many nurses to burnout, compassion fatigue, and, tragically, suicide? In response to these concerns, the American Nurses Association (ANA) launched a *Healthy Nurse Healthy Nation* (HNHN) campaign in 2019.[1] As part of the HNHN campaign, annual surveys are released asking why are nurses overweight, less active, and sleeping less than the general population. Why are nurses reporting high levels of anxiety and depression related to the toll of "taking care of others?" Why are nurses leaving the profession, a trend that began even before the COVID-19 pandemic?

For more than 20 years, nurses were consistently reported to be the "most trusted" of all healthcare professionals,[2] and yet the question has to be asked, "Can we be trusted to take care of ourselves?" Are we caring, loving, and compassionate to ourselves? Or do we simply pour from an empty cup because we perpetually seem to put the needs of others before our own?

Well-being and the cultivation of practices of resilience are intentional strengths that must be built much like the "muscles" we teach our patients to develop after long periods of bed rest. We teach patients to build up muscular strength slowly over time. Nurses must begin the work of intentionally developing practices that result in their own well-being and the competence to navigate the everyday stressors that are inevitable in the practice of nursing. Nurses care for the sick and dying, which is hard work. This work can be draining and requires intentional self-care to "refill" our cup. And so, we invite you to begin the journey of cultivating practices of resilience so that you may enjoy well-being and flourish as you learn the art and science of nursing.

Imagine that you are out on a warm sunny day driving in the countryside. You are cruising along beautiful winding country roads, taking in the scenery, and you come to an abrupt fork in the road. Your pulse races and your breathing quickens as you navigate an unexpected sharp turn. Your mind factors in the risks, and you begin making important decisions that ultimately result in either successfully resuming your trip or ending up on the side of the road in a ditch. How much of what occurs in that moment is related to the care you have given to your car's maintenance? Have you checked the air in your tires? Are your tires roadworthy? Have you maintained your car's oil? Clearly, you must have filled your car up with gas for the engine to run. Do you have windshield wiper fluid in your car's reservoir? Do your car's wipers work in case of rain? The goal of your drive is a successful, safe, and pleasant journey.

Your life as a developing professional nurse is no different. Have you ensured a good night's sleep on a regular basis? Are you eating healthful nutritional food and drinking adequate fluids? Are you getting enough exercise? Are you maintaining social support connections with friends and family? These basic components of self-care are essential to give you the "fuel" to walk into your patients' rooms prepared for both the slow winding roads and the sharp turns that inevitably occur when you take care of them. No doubt, you are committed to the health and well-being of your patients. Nurses help others. That is what they do. Nurses help patients, families, and students, and nurses ask colleagues for help when they need assistance helping someone else. Nurses ask for help turning patients, but it is not a natural nurse ability to ask for help for themselves. We need to do a better job at normalizing the idea that we must first put the oxygen mask on our own face before we can assist those around us. Nurses help others. Are you equally committed to your own health and well-being? Let us begin the journey of caring for yourself so you can better take care of others.

DEFINITION

It is difficult to capture the concept of *Well-Being and Resilience* in a single definition, as these are seen in the literature as separate yet interrelated concepts. A definition of each is provided, followed by a single definition that encompasses the concept in the context of nursing practice.

Defining mental health and well-being is important from the context of individual perspective as well as cultural perspective. From a foundational definition perspective, well-being can be defined as "*the state of being comfortable, healthy, or happy*,"[3] whereas for nurses, well-being often simply affects how

we think, feel, and act. It also helps determine how we handle stress, relate to others, and make healthy choices. In scientific literature, it typically includes concepts of happiness, positive experiences or ideas, life satisfaction, pleasure, a sense of meaning or purpose, and the ability to manage stress and prosperity.[4] Additionally, well-being is multidimensional and includes one's physical, mental, social, and environmental state.[5] Well-being involves self-care in healthy ways, such as awareness of the condition of the body, stress reduction, and self-responsibility in care. Strategies for achieving well-being assist people to find new ways of understanding and being in control of their lives, both individually and collectively.[6] More generally, well-being is just feeling well. Well-being is something sought by just about everyone because it includes so many positive things: feeling happy, socially connected, and purposeful.

Well-being is traditionally linked to psychology-sourced thinking, even though it can be used in a broader and more holistic way. Well-being, particularly within the nursing profession, tends to be used in a more psychologically or spiritually oriented perspective.[7] Ryff defined psychological well-being as a process of self-realization, consisting of six dimensions: autonomy, environmental mastery, personal growth and development, positive relations with others, purpose and meaning in life, and self-acceptance.[8] Nurses engage in this process of self-realization, as they face the daily challenges of caring for others, particularly the dimension of self-acceptance as they tackle seemingly insurmountable expectations. Well-being is attained by achieving a state of balance affected by both challenging and rewarding life events.

Challenging life events require resilience. Resilience can be defined as *the ability to move forward quickly and thrive, even potentially experience growth, despite adverse conditions, challenging situations, and obstacles*.[9,10] Resilience is the ability to adapt by using coping skills to problem solve.[11] Being resilient does not mean that people don't experience stress, emotional upheaval, and suffering. While there are inconsistencies reported in the literature regarding personal traits that promote resilience, resilient people tend to possess emotional awareness, well-being, tenacity, hope, spirituality, positive relationships, a sense of humor, self-control, a realistic life view, and good physical health.[12] Resilient people are aware of situations, their own emotional reactions, and the behaviors of those around them. By remaining aware they can maintain control of a situation and think of new ways to tackle problems. In many cases, resilient people have an inner strength that enables them to learn from adverse experiences and emerge stronger after such difficulties.[13] As this concept represents both well-being and resilience, a comprehensive definition for this concept presentation is offered: *The intentional practice of health behaviors and the subsequent resilience associated with well-being.*

SCOPE

The scope of Well-being and Resilience encompasses the entire nursing profession in all settings and across levels of education. The scope of this concept can be visualized on two continuums: the extent of well-being and resilience behaviors (from high to low) and the capacity of well-being and resilience. In both cases, these continuums are not stationary and influence each other. While easy to conceptualize as a simple relationship, the continuum lacks the ability to express compounding factors that move the needle up and down or back and forth with the resulting shifts. The goal for nurses is to strive to exist on the upper ends of both continuums through the practices of self-care; these continuums are shown in Fig. 37.1.

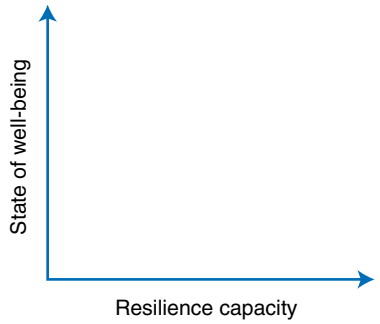

Fig. 37.1 The scope of Well-being and Resilience is shown as a state of well-being and resilience capacity.

ATTRIBUTES/CRITERIA

An attribute is a quality or characteristic that is associated with the concept that helps to clarify or confirm the concept. Attributes contributing to well-being and resilience include self-awareness of one's attention to the different dimensions of wellness. Wellness encompasses at least eight interdependent dimensions: physical, intellectual, emotional, social, spiritual, vocational, financial, and environmental. The gold standard would be a nurse who attended to each of these dimensions successfully on a regular basis. The stressors of work, school, and family demand time and attention that draw nurses away from taking care of themselves to care for others.

The goal for "healthy nurses" is to increase self-awareness of one's health on the different dimensions with an overall goal of reasonable health in all areas. Self-awareness is the beginning of contemplating the need for change toward routine practices of self-care (Fig. 37.2). With an ever-growing body of knowledge linking negative-quality patient care and patient safety outcomes, including medical errors and adverse events, to the health and well-being of nurses,[14] the urgency for nurses to aspire to attributes of well-being and resilience could not be greater. Think about the last time you stayed up studying or worrying all night due to an event you have no control over and you didn't sleep—your emotional, mental, and physical well-being were resultantly low, affecting your resilience. Now think about "staying in the moment", noticing and accepting the connection of being tired and concerns you have for taking care of patients in the clinical setting. How could you practice self-care? Taking a moment to breathe deeply for several minutes, eating a healthy breakfast, drinking water, and asking your instructor or another nurse for help could make a tremendous difference to protect your health as well as your patient's health.

For more than two decades, scholars have described factors contributing to the economic and organizational value of

well-being by emphasizing that it is more than just the absence of illness.[15] The National Institute of Mental Health (NIMH) further refers to the concept of Well-Being as influenced by several biologic, psychological, social, and environmental factors that interact in complex ways with individuals, families, communities, and health systems.[16] These include:

- *Structural factors* such as safe living environments, employment, education, freedom from discrimination and violence, and access to economic resources
- *Community factors* such as a positive sense of belonging, community connectedness, activities to highlight and embrace diversity, social support, and participation in society
- *Individual factors* such as the ability to manage thoughts and cope with stressors and having communication and social skills to support connections with others[16]

Similar to the NIMH attributes for well-being, researchers consistently report a strong positive link between resilience and well-being, with some proposing that greater well-being can serve as an antecedent of resilience.[17] In addition, researchers link resilience with how individuals are managing their own emotional state or building and sustaining better relationships through emotional and social intelligence attributes. Further, researchers describe resilience as a state activated by adversity and accomplished by a positive outcome characterized by self-efficacy, sense of humor, patience, optimism, and faith.[18]

In addition to basic healthy practices of sleep hygiene, nutrition, hydration, and activity, mindfulness practices have been validated as effective tools for increasing resilience. These practices can be done by nurses anywhere, at any time, at no or low cost to help rewire brains and strengthen the neuroplasticity efforts for well-being and resilience. A leading author and advocate for compassionate care, Dorrie Fontaine, calls self-care practices "superpowers" that nurses do not often know they have. With intentional effort, practices such as cognitive reappraisal or reframing, paying attention, staying present, being curious rather than judgmental, and reflecting are all tools that, over time, naturally help our brain respond better in times of stress.[19]

THEORETICAL LINKS

The attributes described previously provide a means for understanding the concepts of Well-Being and Resilience, and the 10 Caritas Processes of Watson's Theory of Caring offers a strong theoretical foundation (Box 37.1). Watson believes caring/loving radiates in concentric circles from self to others, the community, and the world at large.[20] According to Watson, "*Caring begins with being present, open to compassion, mercy, gentleness, loving-kindness, and equanimity toward and with self before one can offer compassionate caring to others.*" Yet, work that is more recent recognizes how today's healthcare environment challenges Watson's Theory. These challenges include a diminishing workforce, staff turnover, admission of more acutely ill patients with complex needs, cultural differences, and economic factors, as well as organizational, social, and healthcare policies. These factors influence the amount and quality of time a nurse can spend with patients.[21] Although all the processes have theoretical linkages for well-being and resilience, the first caritas is perhaps the most plausible foundation for self-care. The Jean

Fig. 37.2 Self-Awareness and Well-Being.

BOX 37.1 TEN CARITAS PROCESSES OF WATSON'S THEORY OF CARING

1. **Embrace:** Sustaining humanistic-altruistic values by practicing loving-kindness with self and others
2. **Inspire:** Being authentically present, enabling faith and hope, and honoring others
3. **Trust:** Being sensitive to self and others by cultivating own spiritual practices, beyond ego self to transpersonal self
4. **Nurture:** Developing and sustaining loving, trusting-caring relationships
5. **Forgive:** Allowing for expression of positive and negative feelings—authentically listening to another person's story
6. **Deepen:** Creatively problem solving through caritas process—full use of self and artistry of caring-healing practices via use of all ways of knowing/being/doing/becoming
7. **Balance:** Engaging in transpersonal teaching and learning within context of caring relationships
8. **Cocreate:** Creating a healing environment at all levels; subtle environment for energetic authentic caring presence
9. **Minister:** Reverentially assisting with basic needs as sacred acts, touching mind/body/spirit of other; sustaining human dignity
10. **Open:** Opening to spiritual, mystery, unknowns—allowing for miracles

Watson's Transpersonal Theory advocates that the nurses themselves are fundamental for the development of the nurse-patient relationship and for promoting well-being by shaping a system of altruistic values through instilling faith and hope by recognizing their own sensibilities and feelings.[21]

As Watson's theory continues to evolve, the underpinning remains the same; if we do not properly take care of ourselves, our capacity to care affects our ability to give quality care to others.[22] Applying the acronym CARING[23] that Hernandez created using Watson's theory suggests a way to expand our ability to strengthen the care provided to others:

- **C** for self-compassion,
- **A** for awareness,
- **R** for reflection,
- **I** for intentionality,
- **N** for nonjudgmental attachment (acceptance),
- **G** for gratitude.

The CARING acronym's concepts offer a practical approach to self-care and may include self-care practices such as meditation, mindfulness, journaling, prayer, the use of positive affirmation, self-awareness, intentional time spent in nature, adoption of a gratitude practice, forgiveness, and silence. These practices can be implemented as ways to put into practice the first Caritas Process of sustaining loving-kindness to self and others.[22]

Although having tools based with evidence and theoretical frameworks are important for nurses to advance self-care and resilience practice, it is not enough to address the realities of today's workplace. Even the most resilient nurses are at risk for suffering a stress injury in the face of workforce shortages, disrespectful behaviors, workplace violence, and discrimination.[19] Stronger action by organizational leaders is needed to "walk the talk" of patient safety by protecting and advocating for the well-being of nurses. The most magical ingredient for resilience is relationship-based, and it is through connections in our work lives that protect and advance holistic well-being for nurses.

CORE COMPETENCIES

Well-Being and Resilience

- **Practice self-care.** Take time to make your mental, emotional, and physical health a top priority.
- **See self as in control.** Focus on how you, as opposed to external forces, can control the outcome of events.
- **Reframe negative thoughts.** You can retrain your responses to difficulties in your life. A positive outlook can help you to cope better.
- **Build social networks.** Social support is important. Rely on family, friends, and coworkers when needed, and continue to grow your social network.
- **Increase optimism.** Optimism can help you feel more in control of your circumstances. Focus on what you can do, and identify positive steps you can take to solve problems.
- **Learn skills to cope.** Find ways to release stress daily and learn techniques to reduce anxiety, such as deep breathing and meditation.
- **Practice gratitude.** Try writing down three people or things that you are grateful for every day.
- **Rely on problem-solving skills.** Identify ways within your control to work with and solve problems.
- **Know strengths and areas for improvement.** Knowing what you do well and what stresses you can help you deal with difficult situations and help you avoid things that might overwhelm you.

From: Ellin, A. (2020). *Everyday health. Special report: Why developing resilience may be the most important thing you can do for your well-being right now.* Retrieved from https://www.everydayhealth.com/wellness/state-of-resilience/

CONTEXT TO NURSING AND HEALTH CARE

Current State of Well-Being of Nurses

The mental health and well-being of nurses (and other healthcare providers) was challenged long before the pandemic, with high frequencies of burnout, debilitating anxiety, depression, and even suicide. Researchers are increasingly concerned about the high levels of stress nurses face and how the pandemic brought an even higher toll on the mental health of thousands of frontline providers. Pre-COVID, the prevalence of suicide among nurses was higher than among the U.S. general population.

Recognizing that the mental health and well-being of nurses has been an ongoing issue, nursing leaders began calling for active engagement to destigmatize and reframe mental health so that it is "okay not to be okay." The ANA's HNHN Campaign evolved to include frequent surveys known as the "ANA pulse" on the nation's nurses. Recent data sounds alarm bells that calls for urgency to rebuild the well-being of the nursing workforce.

Throughout the country, addressing mental health and the well-being of all nurses has become a top priority in organizational, academic, and association settings. While nurse well-being is a key strategic initiative, special attention is also being given to you, our youngest nurses. We know from research that growing up with digital devices has made it harder for younger Millennials and Gen Z to have face-to-face conversations, and the pandemic only magnified that.[24] We have also learned the importance of initiating a conversation about well-being because younger nurses may not do so.

Organizational and academic nurse leaders are taking strong initiatives to destigmatize individuals seeking mental health care and to establish a standard that nursing students become as competent with their self-care skills as they are with their physical assessment skills.[25]

Can you begin to see how well-being and resilience are intertwined and of critical importance to the professional nurse? So how do we create resilience for ourselves? How can you take care of others if you have not taken care of yourself? The first step in fostering resilience and promoting well-being is to remember to take care of yourself so you can better take care of others. Resilience is a skill that can be learned and strengthened.[10] What do you do now to take care of yourself? What activities or practices do you engage in on a regular basis to ensure that your mind and body are healthy? Do you sleep well? Do you eat a nutritious diet and stay hydrated? Do you engage in some type of regular activity? Do you maintain supportive relationships with family and friends? Are you interested in learning more about self-care strategies? Well-being and resilience require that you begin the important practice of self-care.

Imagine that you have finally boarded a plane and are on your way to your destination. You are tired because you were up late packing the night before getting ready for your trip. You sit down in the middle seat and look to your right and there is a young person listening to their music and on your left is an elderly gentleman reading a newspaper. The pilot comes on the loudspeaker and announces, "We are ready for take-off." The plane begins to ascend and, to your horror, starts shaking, and the flight attendants ask everyone to prepare for turbulence. Oxygen masks drop from the ceiling. Do you turn to help those sitting beside you, or do you put your OWN oxygen mask on FIRST?

Organizational Strategies to Promote Wellness and Resilience

Organizations that employ or educate nurses should be aware of the need to address wellness and resilience capacity among nurses and student nurses. There are several organizations that are exemplary in providing such support; four are described.

Academic Health Center Intentions to Cultivate Practices for Resilience

At the University of Kentucky, the College of Nursing created a room for cultivating practices of resilience, known as the CPR Room, where programming promotes mental health and wellness services for employees and students.

MINDBODYSTRONG Programming for Well-Being and Resilience

At The Ohio State University, newly licensed registered nurses participating in a nurse residency program engaged in a MINDBODYSTRONG for Healthcare Professionals program on mental health, healthy lifestyle behaviors and job satisfaction, a cognitive behavioral skill-building program incorporating strategies to improve mental and physical health. The MINDBODYSTRONG program consists of eight weekly sessions that focus on three areas: caring for the mind, caring for the body, and skills building.

Interprofessional Health Education Advancing Mindfulness Practices

The Center for Interprofessional Health Education (CIHE) and the College of Nursing at the University of Kentucky created a CPR (Cultivating Practices for Resilience) Camp retreat weekend of mindfulness activities at Shaker Village of Pleasant Hill, Lexington, Kentucky. Faculty facilitators for the CPR Camp were certified in Koru and Mindfulness-Based Stress Reduction (MBSR) to provide training in cultivating practices for resilience.

Appreciative Inquiry for Compassionate Care Practices

The Healthy Work Environment initiative at the University of Virginia School of Nursing (SON) grew out of a purposeful Appreciate Inquiry Summit. Precise statements of what a Healthy Work Environment (HWE) meant were organized into five areas: Respect and Appreciation, Communication, Workload, Physical Environment, and Interpersonal Relationships. Those elements provide the framework for HWE activities. The Compassionate Care Initiative (CCI) takes an even broader focus to cultivate a resilient and compassionate healthcare workforce through innovative educational programs. CCI offers classes to everyone in the spirit of building a healthy community. The SON provides dedicated space for quiet mindful reflection with classes in yoga and meditation in a donor supported "Resilience Room" that remains open to accommodate drop-in visitors in addition to organized classes and workshops. Students learn positive self-care skills to mitigate burnout and compassion fatigue by developing self-care plans.

INTERRELATED CONCEPTS

The concept of Well-Being and Resilience is closely related to several concepts in this book (Fig 37.3). **Person-Centered Care** emphasizes the need to know the patient and their family from a holistic approach. This requires that nurses and other healthcare professionals commit to a high-level of interaction and support of the patient and their family members. Nurses who are in a positive state of well-being and resilience have the capacity for such responsiveness. Two other concepts, **Health Care Quality** and **Safety**, are interrelated because quality patient care and patient safety outcomes (including medical errors and adverse events) have been linked to health and well-being of nurses.[14] Finally, one of the health and illness concepts—**Stress and Coping**—closely links to well-being and resilience. Positive coping strategies help mitigate stressors associated with professional practice and other personal factors facing nurses and, thus, contribute to wellness and resilience. When practicing from a holistic perspective, nurses understand the dynamic, ongoing body-brain-mind-spirit interactions of the person, between and among individuals, groups, communities, and the environment.[26]

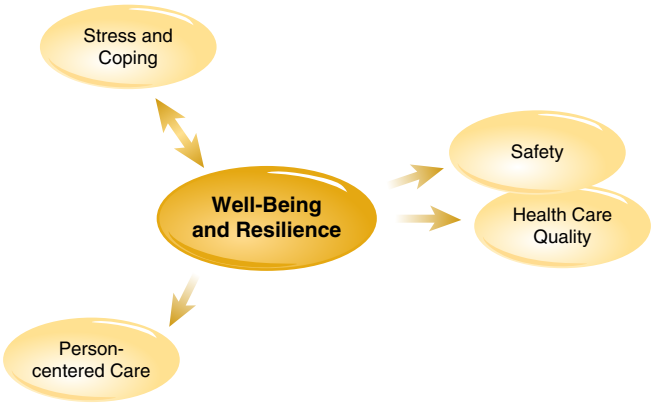

Fig. 37.3 Well-Being and Resilience and Interrelated Concepts.

BOX 37.2 EXEMPLARS TO SUPPORT WELLNESS AND RESILIENCE

- Mindfulness activities
  - Mindful breathing
  - Mindful walking
  - Mindful listening
- Appreciative inquiry
- Guided imagery
- Sleep
- Healthy eating
- Regular exercise
- Yoga
- Positive interpersonal relationships
- Cognitive behavioral skill-building

CLINICAL EXEMPLARS

There are a number of exemplars of Well-being and Resilience; these are useful in providing further clarity regarding this concept. Well-being and Resilience encompass all areas of nursing practice; thus, these exemplars provide specific context. A list of exemplars is presented in Box 37.2. Some of these are briefly described in the following section.

Featured Exemplars

Mindful Breathing

Mindful breathing is a fundamental stress management skill that can be used in many situations. Mindful breathing activates the parasympathetic nervous system, effectively providing relief to an overstimulated nervous system. It is one of the most simple and effective ways to calm our nervous system and lower our stress. After just a few minutes of practice, breathing helps slow the heart rate, lower blood pressure, and decrease muscle tension. This will help you feel calmer any time you use it. It is great to use when you are ready to settle into sleep but also during stressful situations such as during an exam or if you find yourself fin a disagreement with someone.

Mindful Walking

Walking meditation is important to use when you feel too restless or anxious to sit still. The movement of walking and the feeling of your feet on the ground can be a calming practice. When walking outside, pay attention to the temperature of the air, the sounds of wildlife, the colors of the sky and grass, and the shapes of the trees. Walking may help you to feel more grounded, balanced, and serene. It also helps you to develop a different awareness of your surroundings, body, and thoughts.

Guided Imagery

Guided imagery is a visualization exercise useful for creating a feeling of calmness or relaxation in your body and mind. Importantly, use all your senses when visualizing. This helps your brain relax and respond as if you are really in the place you are imagining. Choose a place either real or imagined—a special place where you feel comfortable and safe. Imagine the scene with all your senses. Hear the sounds, smell the aromas, and feel the air and the whole environment you are in. Notice how your body feels in this place, and take some time to enjoy this feeling of comfort in your special place. Remind yourself that you can return to this place or a similar place whenever you wish.

Sleep

Sleep is essential to every process in the body affecting our physical and mental functioning and our ability to fight disease and develop immunity. Adults need between 7 and 9 hours of sleep per night. Sleep hygiene tips include maintaining a regular sleep routine, limiting daytime naps, exercising routinely, and avoiding TV and computers/devices 2 hours before bed. Monitor your eating and drinking habits and finish eating 2 to 3 hours before going to sleep. Limit how much you drink right before bed and avoid alcohol and caffeine, which can both prevent you from falling into deep stages of sleep throughout the entire night. Create a room ideal only for sleeping. Your bedroom should be cool, dark, and quiet. Try calming activities before bed such as journaling or yoga to manage your stress or anxiety.

Regular Exercise

Exercise at least 150 minutes of moderate activity or 75 minutes of vigorous activity a week. Guidelines suggest that you spread this exercise over the course of a week. To provide even greater health benefit, at least 300 minutes a week is recommended. But even small amounts of physical activity are helpful. Being active for short periods of time throughout the day can add up to provide health benefits. If you can't fit in one 30-minute walk during the day, try a few 5-minute walks instead. Any activity is better than none at all. What's most important is making regular physical activity part of your lifestyle.

CASE STUDY #1

Case Presentation

Brianna Jackson is 20 years old and has wanted to become a nurse ever since she can remember. Both her grandmother and her aunt are retired nursing assistants, and she has heard them talk about how meaningful it was taking care of their patients and how much they wish they could have had the opportunity to become a registered nurse. Brianna has wanted to follow in their footsteps to make a difference in people's lives by fulfilling her dream of becoming a nurse.

Brianna is now in her first semester of nursing school at a university 4 hours away from her hometown after transferring from a community college. She has always been a good student; prior to enrolling in the nursing program, she never had to study very hard to get straight As. However, she has found the nursing classes to be much more challenging.

She is the first person in her family to attend college and is paying for school through scholarships, student loans, and holding a part-time job. She is barely making ends meet and worries about the amount of debt she will have by the time she graduates. Although she is regularly invited to go out with other students from school, she typically declines because she either doesn't have the money, needs to study, or must work. As a result, she has been unable to make many friends. Despite putting forth her best effort, Brianna is barely passing her nursing classes as midterm approaches. She is beginning to feel anxious about whether she has what it takes to become a nurse and is concerned that she will lose her scholarship if she does not maintain at least a B average.

Brianna received a call from her mother that her father was injured in a car crash and is in the hospital; she was told to come home for the weekend to help take care of her three younger siblings. Not wanting to let her parents down, she leaves school early on Friday and drives home. As she drives, she feels guilty for being away at college (is she being selfish?) and is worried about not getting hours in at her job (she has bills to pay) and about studying for an important examination on Monday. While at home, Brianna takes care of her siblings during the day, visits her father at the hospital in the evening, and then stays up late studying to prepare for the examination. She can't even find time to shower or do her laundry!

On Monday morning, Brianna gets up at 4 a.m. to make the drive back to the university so she can be back in time for her examination. As she pulls into the parking lot at school, she receives another call from her mom telling her that her father has been discharged, and she will need Brianna's help taking care of him. Specifically, her mom asks her to come back home after the exam to continue to help. Family means the world to her, but so does her dream of becoming a nurse.

Brianna hangs up the phone and rushes into class moments before the examination. She starts to feel dizzy, and she can feel her heart pounding. As she begins the exam, she is unable to concentrate and suddenly finds it difficult to breathe.

The instructor can see something is wrong and asks Brianna if she is ok. Brianna bursts into tears, feeling she has no control over anything. As Brianna is escorted down to her advisor's office, she feels embarrassed about crying in front of others in the class and wonders if she should just drop out of the program.

Case Analysis Questions

1. Consider the attributes of the concept presented earlier in the chapter. What attributes are evident in Brianna's case?
2. What strategies might her advisor suggest to support her mental health and well-being?
3. Discuss how Brianna's mental health and well-being might be affected by her resilience.

CASE STUDY #2

Case Presentation

Leshia Brown is a 28-year-old nurse who has been working in the Trauma ICU for 5 years. She just started a new job, and the unit has been short-staffed. Leshia realized within the first few weeks after completing orientation that, with constant patient calls, adjusting to new hours associated with shift work, and picking up additional shifts, there was limited "me time." She understood that when you are trying to catch up on sleep, keep things together at home, and deal with feelings of burnout on your days off, taking time to better yourself and your health and wellness can be challenging. Leshia talked with some of her new colleagues about tips to prioritize self-care. The nurses discussed the importance of making sleep a priority and eating healthy foods and drinking plenty of water. lesha committed to walking most days for about 30 minutes outdoors and to keeping a journal listing two or three things she is thankful for each day. She learned to take slow, deep breaths throughout the day to focus her thinking and calm herself. She reaches out to her family and friends for support, and when she feels particularly stressed, she talks to a professional therapist. lessha understands how you can incorporate some practices of self-care to create balance in her physical, emotional, and mental health.

Case Analysis Questions

1. Consider the attributes of the concept presented earlier in the chapter. What attributes are evident in Leshia's case?
2. What strategies does Leshia use to ensure well-being and resilience?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT
38

Leadership

Kathleen M. Turner

The concept of Leadership is an essential aspect of the role of the registered nurse (RN). Nurses are called upon to be leaders in every aspect of their work and professional responsibilities. RN competencies delineate leadership as a necessary quality for all professional nurses. Nurses are expected to be proficient leaders, asserting control, influence, and power in professional and personal contexts, which includes advocacy for patients and the nursing profession as leaders within healthcare delivery.[1] Nurses have a role in health policy and shaping the healthcare systems of the future.[2] A new generation of nurse leaders is needed, recognizing the importance of diversity and equity and the link between Social Determinants of Health (SDOH) and health status. Nurse leaders have an important role in acknowledging the history of racism and to help mitigate the effects of discrimination and implicit bias on health.[3] This concept presentation introduces the general principles of leadership and their application in nursing and health care.

DEFINITION

There is a vast body of literature on leadership in work settings, including healthcare environments. For the purposes of this concept analysis, leadership is defined as *an influential relationship among leaders and followers who intend real changes and outcomes that reflect shared purpose and goals.*[4] Leadership involves three dynamic elements: a leader, a follower, and a situation. The leader provides guidance to followers, directing them toward a vision or goal and giving support to enable their success in the particular situation or setting.

SCOPE

The scope of leadership encompasses formal leadership and informal leadership (Fig. 38.1). Individuals who occupy designated administrative or management positions in an organization are considered to hold formal leadership positions. Chief executive officer, chief nurse executive, vice president for patient services, and nurse manager are common examples of formal leadership positions in health care. Depending on the location of the institution and type of setting, titles may vary. Other types of formal leadership positions are elected or appointed positions in professional nursing associations. Examples include president or committee chairperson or a member of a board of directors in a professional organization, healthcare board, or a state board of nursing.

Informal leadership by individuals who do not occupy a designated administrative or management position also occurs in organizations. Individuals are perceived as informal leaders because of their capabilities, actions, and influence. An example is an experienced staff nurse who is recognized as a clinical leader because of their expertise, their willingness to be a spokesperson for staff, or their involvement and advocacy related to important issues for nursing and patient care. Often these influential individuals are recruited for formal leadership positions or opportunities to lead groups or projects.

ATTRIBUTES AND CRITERIA

To accurately describe the attributes and criteria for leadership, it is necessary to present the difference between management and leadership. Management is the attainment of organizational goals in an effective and efficient manner through planning, organizing, staffing, directing, and controlling resources.[4] Management entails organizing to accomplish a plan; leadership is concerned with communicating a vision. The scope, influence, and responsibilities are very different and important to keep in mind when discussing the attributes of leadership.[4] Effective leadership is validated and occurs when key attributes are present: followers, vision, communication, decision making, change, and influence. These attributes are presented in Fig. 38.2 and are described in the following sections.

FIG. 38.1 Scope of Concept: Leadership.

Followers

There are no leaders without followers and no followers without leaders. In fact, most employees spend a large part of their work life as followers. Even leaders are followers in some settings, activities, and situations. Consequently, the success of an organization depends on the ability of leaders to align followers to create outcomes by building relationships through personal qualities such as enthusiasm, integrity, courage, and humility.[4]

The strength and permeability of the boundary between a leader and followers will depend on the leader's style. For example, autocratic leaders may maintain more distance from followers, interacting with them less than a leader who employs a democratic style. In contrast, transformational leaders will have high interaction with followers. Fig. 38.2 designates a broken line to show this boundary between leaders and followers.

Vision

Vision can be defined as *a picture of an ambitious, desirable future for a group*.[4] A vision is a leader's ideological statement of a desired, long-term future for an organization. It is the future that a leader wants to create. Thus, the vision is something to be worked toward over time. The aim of leadership, as indicated by its definition, is to guide and direct followers toward the vision or toward goals instrumental for attaining the vision. Articulating a clear vision is an essential component of transformational leadership, whereas in transactional leadership the leader is focused on performance goals for followers. To move followers toward a vision, a leader will use several processes. Three commonly used processes are communication, decision making, and change.

Communication

Communication is an essential function of effective leadership. In fact, leadership has been referred to as an ongoing conversation between a leader and followers. Leaders communicate with their followers, other leaders, the organization's clients, and people outside the organization to give and receive information. Fig. 38.2 depicts communication between the leader and followers as a process that spans the boundary between parties. The way in which a leader communicates with followers depends on the leader's style. Laissez-faire leaders may have little communication with their followers. Authentic leaders use open communication and transparency to build trust with their followers.

Decision Making

All leaders make decisions that affect others and their organization's success. Good decisions are among the most critical features of good leadership; those decisions may also be among leaders' most invisible actions. Like communication, decision making occurs at the boundary between a leader and followers (see Fig. 38.2) and varies depending on the leader's style. Democratic leaders use a participatory style of decision making. Autocratic leaders are more likely to make decisions without follower input. Laissez-faire leaders generally allow followers to make independent decisions except in a crisis. To make effective decisions, leaders must be flexible and rely on the situation to determine the leadership style best suited for a particular situation. For example, in an emergency such as a cardiac arrest, an autocratic style of leadership is necessary to make decisions quickly for an optimal patient outcome. To determine a process that improves nursing care delivery, it is best to use a participatory or democratic style to have input for the best outcome.

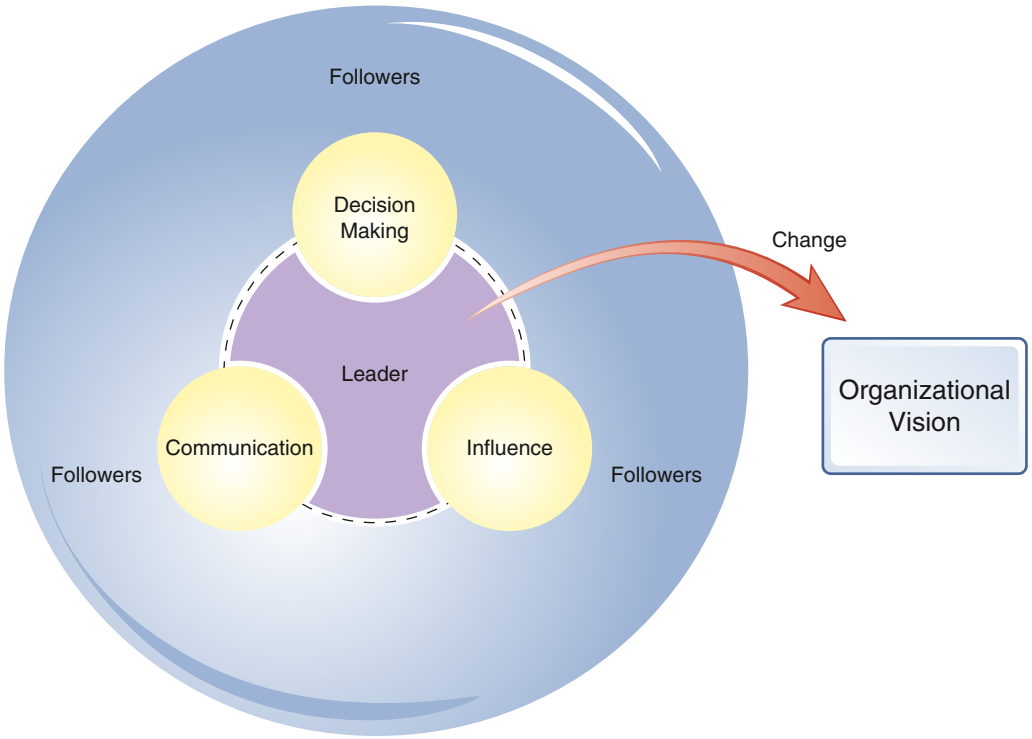

FIG. 38.2 Attributes of Leadership.

The laissez-faire style may be very valuable in situations that do not require leadership oversight and allows followers to make efficient decisions and feel empowered.

Change

Change is the transition from an old state to a new state. Leaders guide the change process by working with their followers to move the organization or department toward the established vision and goals. A leader's change-management skills are vital in the change process. A leader influences change by using effective communication skills, understanding the organizational culture, considering alternate paths to achieve a goal, identifying and dealing with differences among followers, and creating leverage to motivate followers toward the vision.

Influence

Influence is highly dependent on role and, consequently, on responsibility, authority, and accountability. It may be within someone's responsibility to act, but they may not have the authority to make a final decision, nor are they accountable if something goes wrong. Those with actual authority and accountability may have significant influence by nature of their title and role. In addition to role, responsibility, authority, and accountability, influence is also dependent on the leader's ability to build relationships. Influence through relationship building can be the result of personal qualities such as enthusiasm, integrity, courage, trust, expertise, and humility. Sundean and colleagues developed an operational definition of influence through a concept analysis and found that nurse leader influence is dependent on the integration of advocacy, communication, ethics, engagement in professional activities, building relationships, and collaboration in all settings.[5]

THEORETICAL LINKS

Leadership theory has evolved in waves since the beginning of the twentieth century. Each wave includes specific theories founded on common assumptions and incorporates different dimensions. As new waves of theory have emerged, they have not completely replaced previous theories but instead added to the understanding about this complex concept of Leadership. As theory and research have advanced over time, the concept of Leadership has evolved to describe and meet the challenges faced by leaders. Leadership is no longer seen as a set of traits; it is now understood to be a multifaceted, dynamic process that requires different skill sets for different situations. Today's leaders must first know themselves, understand and relate effectively with their followers, and be responsive to multifaceted situational dynamics to be effective.

Great Man/Trait Theories

The earliest leadership theories adopted the idea that leaders were born with certain heroic leadership traits. The "Great Man" put everything together and influenced followers based on traits, qualities, and abilities.[4] A key assumption of these theories is that traits can be used as criteria to select effective leaders. When the great man theory was first proposed, leaders were almost exclusively males from aristocratic backgrounds. Research based on the great man approach focuses on identifying traits of great leaders. Historically, this included physical characteristics and demographic traits. In the 1920s, researchers identified particular traits or characteristics that distinguished them from nonleaders and were believed to contribute to their success as leaders.[4] Such traits as personality (e.g., self-confidence and decisiveness), intellect (e.g., high IQ and reflection), and social attributes (e.g., friendliness and sense of humor) were thought to add to a leader's success and effectiveness. However, research failed to clearly identify a list of universally accepted successful leadership attributes, and in the 1950s researchers looked to examine what a leader does rather than who they were.

Behavior Theories

The second wave of leadership theory concentrates on leader behaviors. The core assumption of this wave is that effective leaders must use a variety of behaviors to be effective. Research using behavioral leadership theories has shown that effective leaders demonstrate high concern for employee needs, feelings, and morale and address task accomplishment and organizational productivity. Emotional intelligence has gained popularity, and research has shown emotional intelligence is critical for leadership success. EI is the ability to monitor one's own and other's feelings, utilizing the information to guide thoughts and actions.[6] When leaders are able to identify their emotions and are sensitive to the emotions of others, they are positioned to build relationships and inspire, motivate, influence, and promote professional development in others.[6]

Contingency Theories

Researchers progressed to consider contextual and situational variables that influence effective leadership behaviors.[4] Contingency theories aim to explain why some leadership approaches are effective in one situation and not in another. These theories take into consideration the subtle, complex ways a leader's traits and behaviors, followers' needs and values, and situational parameters interact. It challenges the assumption that there is "one best way" to lead. For example, a leader is more likely to guide and monitor inexperienced nurses as they perform new responsibilities than they would when the nurses are experienced and performing routine responsibilities.

Influence and Relational Theories

The underlying assumption of the fourth wave of leadership theory is that leaders inspire, intellectually stimulate, and recognize the contributions of their followers. Charismatic leaders influence followers through their personality and charm; they develop an emotional relationship that motivates followers. Since the late 1970s, many ideas on leadership have focused on the relational aspect, i.e., how leaders and followers interact and influence one another.[4] Two significant relational theories are transformational leadership and servant leadership. Transformational leadership is characterized by bringing about change from followers at an organizational level.[4] Transformational leaders convey high expectations to their followers, challenging their perceptions about what can be

attained and building their commitment to an organizational vision. Transformational nurse leaders encourage followers to grow professionally, which positively affects their job satisfaction and work performance.[7]

Another relational theory that is not as popular in nursing literature as transformational is servant leadership. Servant leadership is best described in comparison to other approaches in terms of giving up control to focus on serving followers to develop their potential. Servant leaders transcend self-interest to serve the needs of, support professional growth of, and provide opportunities for others.[4]

Complexity Leadership

The complexity leadership approach is derived from complexity science, a way of thinking that reflects the dynamic and knowledge-based nature of the world in the 21st century. Using complexity science as a framework produces markedly different approaches to leadership than the theories presented previously. Complexity science assumes interconnectedness among the parts of a system and between the system and its external environment. Interaction among the interconnected parts can affect the entire system, often in substantial ways. Another assumption of complexity science is nonlinearity. Throughout the decades, organizational theory has been based on the assumption that organizations are designed to work "like a well-oiled machine." Complexity science, however, recognizes that organizational processes are often nonlinear and unpredictable. Through the dynamic interplay of negative and positive feedback, an organization can make changes to keep abreast of the environmental context. Self-organization is another assumption of complexity science. Employees at the frontlines will self-organize to enable the organization to adapt to change, innovate, and create new capabilities.[8]

Leaders who apply complexity science will not direct or control the process of solving organizational problems. Instead, they recognize the interrelationship of workers and ideas, ensure communication and information flow to them, and foster innovative solutions to work challenges. The complexity leader brings workers together, helps them recognize their ability to find solutions to problems, and removes organizational barriers so the solution can emerge from the workers most affected by the problem.[8]

CORE COMPETENCIES

Leadership

- Integrate evidenced based knowledge from nursing and other disciplines regarding leadership principles.
- Formulate relationships with mentors to support the development of leadership behaviors and qualities.
- Demonstrate leadership behaviors in clinical situations.
- Practice self-reflection as a mechanism to develop leadership behaviors.
- Influence change within the clinical setting, guided by leadership principles.
- Observe and reflect on the leadership styles of others in the context of clinical situations and decision making.
- Maintain awareness of implicit biases and effect on decision making.

CONTEXT TO NURSING AND HEALTH CARE

An expected role and competency of nurses is leadership; it is required of all nurses in all settings. The application of leadership begins in nursing school (with role formation) and continues throughout one's career, through experience, professional commitment, and lifelong learning. Three categories of nursing leadership are clinical leadership, formal leadership, and interprofessional leadership.

Clinical Leadership

Clinical leadership in nursing has been defined as *nurses who provide direct nursing care and exert influence on team colleagues to achieve positive patient outcomes with no formal authority vested*.[9] Clinical leadership is seen across the spectrum of healthcare organizations, especially since care has become more complex with higher patient acuity levels and shorter lengths of stay in hospital settings. It has been documented that these clinical nursing leaders identify areas for improvement, advocate for patients and families, motivate members of the care team, and lead change initiatives that improve patient outcomes.[9,10]

Developing Clinical Leadership Skills

It is necessary for all nurses to exhibit clinical leadership skills; thus, it is intentionally incorporated into nursing education programs. As an example, the American Association of Colleges of Nursing (AACN) publishes the *Essentials* that provides the educational framework for nursing education. Within that framework, the expectations and core competencies for nursing leadership at entry and advanced levels of nursing education are outlined. The expectations and competencies developed through nursing education revolve around being proficient in asserting control and influence, including advocacy for patients and the nursing profession as leaders in the healthcare arena.[3] Ongoing education and training are needed to cultivate these competencies, thus empowering nurses to address clinical problems with a sense of control.

Formal Nursing Leadership

The increasing complexity and rapid changes in health care demand effective leadership. The aims of nursing leadership are to ensure quality patient care and to create supportive practice environments for nurses. Nurses who hold traditional executive-level leadership positions, such as chief nursing officer or vice president for patient care services, partner with other executives to establish the organizational vision, align the goals and operations of the nursing department with the organizational vision, and help formulate policies to advance and improve patient care outcomes. Nurses in lower-level traditional leadership positions, such as directors and nurse managers, may or may not report to the nurse executive. Their focus is to ensure that day-to-day patient care operations meet established standards, to empower staff to participate in improving patient care, and to create work environments that foster professional practice and nurse satisfaction.

The needs and demands of health care and the profession of nursing today require additional, formal nursing leadership

involvement and development. A few examples are directors and members of boards, quality and safety officers, professional organization and accreditation leaders, and elected and appointed government officials. Nursing responsibility and accountability have increased significantly over the years due to the pivotal influence and role nurses have on health care and their reputation of being the most trusted profession. Mentioned previously, the new generation of nurse leaders must recognize the importance of diversity and equity and the link between SDOH and health status. Nurse leaders have an important role in acknowledging the history of racism and are called upon to mitigate the effects of discrimination and implicit bias on health.[3]

The size and structure of the nursing leadership team depend on the size of the healthcare agency or organization. For example, a small rural hospital may have only one formal nursing leader—a director who supervises all nursing staff. Home health and public health agencies that have offices in several communities may have designated nurse leaders for each site who report to an executive nurse leader at a central location. Academic medical centers and integrated healthcare systems may have many levels of nursing leadership, creating a hierarchy with considerable distance between the nurse executive and nurses who provide direct patient care. It is imperative that nurse leaders extend beyond acute care settings, into the community and beyond. Nursing leaders must position themselves to develop new and evolving nursing leadership positions to have a positive effect on patient care, the scope of nursing practice, diversity, equity, inclusion, and the SDOH.

Preparation for Formal Leadership

Although some individuals have natural leadership tendencies, the most effective leaders are those who have participated in leadership training. Leadership development is essential for all levels of leadership. It is not a single event but, rather, an ongoing and interactive process that enables the leader to reflect, learn, apply, and receive feedback that guides further learning.

Many leadership development options are available, including self-study, seminars, workshops, experiential learning, mentorship from experienced leaders and graduate nursing programs with concentrations in leadership. Hospitals, community health agencies, and professional nursing associations offer leadership development workshops for new and aspiring leaders. The American Association of Nurse Executives (AONL) also offers many programs and resources to nurse leaders. AONL describes the organization as the voice of nursing leadership through education, advocacy, and community.[11] Several well-established national programs sponsored by universities, professional organizations, and health foundations enable nurses to broaden and deepen their leadership knowledge and competencies.[2,3] Regardless of the type of program, the most successful programs incorporate several components and extend over a period of time.

The Impact of Formal Leadership on Outcomes

Researchers conducted a systematic review to determine whether there is a relationship between leader behaviors and healthcare outcomes. Certain leadership styles, empowering and relational, have been associated with positive outcomes for nursing team performance, including in team climate, teamwork, and effectiveness.[10] Team performance improvement is associated with positive outcomes related to quality care. These documented outcomes support formal nursing leadership investment in education, training, and mentoring.[7]

Interprofessional Leadership

Today's healthcare system requires leadership that goes beyond a specific discipline or health profession. In many healthcare agencies and health sector businesses, nurses have interprofessional leadership responsibilities. For example, countless nurses in executive-level leadership positions in hospitals and home health agencies carry titles such as vice president for patient care services and, in addition to nursing, are responsible for other patient care departments, such as pharmacy, physical therapy, and chaplaincy. Nurses also move into formal leadership positions in areas such as clinical informatics and quality management. In these roles, nurses draw on their knowledge and experience as clinicians, their understanding of the healthcare system, and their leadership training to ensure safe and effective patient care.

Nurse leaders at all levels of the organization, formal and informal, are positioned to be valuable partners in interprofessional care environments. Nurses provide care coordination that supports seamless care, serving as advocates for patients and communities.[3] Interprofessional collaboration reduces the use of redundant services and develops more creative solutions to complex patient care problems. In particular, patients with chronic conditions, patients who are critically ill, and the elderly population benefit from coordinated interprofessional care. Research has also shown that interprofessional collaboration can improve quality of care and patient outcomes[12,13] Nurses are typically the healthcare providers who have sustained interaction with patients and their families. It is imperative that formal nurse leaders support nursing staff to use their perspective, knowledge, influence, and relationships with patients and families as vantage points for strengthening interprofessional collaboration and, in turn, the quality of healthcare services and improvement of patient and community outcomes.

INTERRELATED CONCEPTS

Several concepts within this textbook are interrelated to the concept of Leadership. These are presented in Fig. 38.3 and described here.

Healthcare organizations need formal and informal nurse leaders to be effective in providing evidence-based patient care. Formal nurse leaders play an important role at the system level (**Health Systems**), whereas clinical nurse leaders emerge at the point of care delivery or where patient care is provided.

Nursing is a practice discipline geared toward the delivery of health care, and the coordination of safe and effective patient care falls on the shoulders of all leaders. As mentioned previously, there are multiple levels of leadership; thus, some leaders are further removed from direct patient care than others. Nonetheless, the efforts of nursing leaders ultimately support

FIG. 38.3 Leadership and Interrelated Concepts.

the coordination of patient care within the healthcare organization to optimize quality patient outcomes. **Care Coordination** refers to the process of connecting healthcare services and resources to patients and is one of the distinctive contributions that clinical nurse leaders make in patient care.

Because **Communication** is an attribute of effective leaders, it is a key interrelated concept. Clear communication is central to effective leadership. Leaders who communicate often and with clear, consistent, timely messages help followers understand the organization's direction, decision-making processes, and changes. Listening is an essential aspect of communication. Only by listening to peers, followers, patients, and others will the leader understand all dimensions of a problem or opportunity. Effective leaders also provide mechanisms to foster clear communication throughout the organization.

Effective **Collaboration** within and among organizations, and within and across disciplines, is essential to efficient organizations. Skilled nurse leaders encourage and role model this behavior. Collaboration enhances communication and optimal delivery of care.

Nurse leaders help ensure that the actions of the organization, unit, and individuals contribute to **Health Care Quality**. Formal and clinical nurse leaders are attuned to the standards and processes that an organization uses to provide high-quality care. They are involved in improvement initiatives and other change processes to meet the quality goals of their organization. Nurse leaders are knowledgeable and collaborate with professional organizations and regulatory bodies to establish the highest level of quality standards for nursing and health care.

Use of **Evidence** is important for effective leadership. Formal leaders use evidence about different leadership and management approaches to create organizational processes and work environments that contribute to high satisfaction, productivity, and retention of nursing staff. Clinical leaders use research-based evidence and best practices to ensure safe, quality care and guide others in the translation of evidence-based practice into the clinical setting.

Ethics is also important for effective leadership. Ethical integrity is a core element of all leadership practices. Formal leaders practice and role-model high ethical standards. Clinical and interprofessional leaders rely on their knowledge of professional codes of ethics, ethical principles, and decision-making models to protect and advocate for patients in all aspects of patient care.

Use of **Technology and Informatics** is important for all nurse leaders. They must have access to current data to inform decisions about patient care and the operations of the organization. The widespread use of electronic medical records increases the availability of patient data to guide clinical leaders' care decisions and enable formal leaders to assess the effectiveness of the nursing care delivery system and provide resources as needed. Nurse leaders also use information technology to access and disseminate evidence and information that is critical for effective organizational operations. Nurse leaders need to be open to technological advances that will improve patient care and care delivery systems.

CLINICAL EXEMPLARS

Every hospital, community health department, and long-term care facility is likely to have a variety of leadership positions. Box 38.1 presents common examples of formal, clinical, and interprofessional leaders.

Leadership is not an act reserved only for designated administrators and managers. Clinical leaders are needed in every setting to ensure that quality patient care is delivered and that new evidence and research findings are adopted to improve patient care. It is incumbent on nurses who aspire to be leaders, and for those who are leaders to embrace opportunities to continue to develop their leadership skills. Research has shown that strong nursing leadership not only improves patient outcomes but is also associated with an increase in nurse satisfaction, retention, and healthy work environments. Effective nurse leaders

BOX 38.1 EXEMPLARS OF LEADERSHIP

Leadership Roles

Formal Nurse Leader

- Chief nursing officer
- Nursing director/assistant director
- Nurse manager
- Charge nurse/team leader
- Dean
- Associate dean
- State board of nursing executive director

Clinical Nurse Leader

- Experienced staff nurse
- Clinical nurse educator
- Clinical nurse specialist
- Nurse practitioner
- Nurse navigator

Interprofessional Leader

- Director of clinical service line (e.g., primary care services)
- Associate director of infection control department
- Chairperson, quality improvement committee (e.g., ambulatory department)
- Chairperson, reaccreditation steering committee

Leadership Styles

- Autocratic
- Democratic
- Laissez-faire
- Transactional
- Transformational
- Authentic
- Shared
- Servant leader

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can positively influence patient satisfaction with care and other indicators of healthcare quality.[10]

Featured Exemplars

Nurses experience situations in which different leadership styles are effective and portrayed. The exemplars presented here are likely to be encountered at different times and serving different purposes.

Autocratic Leaders

Autocratic leaders make all decisions and are generally most concerned with the tasks to be accomplished. They maintain distance from their followers, motivating them through the overall goal or rewards as incentives. Traditionally, autocratic leadership was thought to be effective for leading new employees and large groups and for controlling work that needs to be coordinated among many departments. It is often used when a decision needs to be made quickly, as mentioned previously, such as in emergencies.

Democratic Leaders

Democratic leaders involve followers in the decision-making process by using a participatory leadership style. The focus is on the followers for active participation. Democratic leadership is useful when the followers are experienced workers, particularly when the expectation from the organization and the leader is active engagement and participation. It is effective when organizational success requires that followers are committed to the goal. Democratic leaders help followers develop technical and emotional maturity and provide the necessary recourses for success.

Laissez-Faire Leaders

Laissez-faire leaders do not interfere with employees and their work. They stand at a distance, giving followers freedom to make decisions and accomplish their work. They may provide minimal information to followers and have little communication with them about their work. Occasionally, laissez-faire leaders must intervene and decide when a crisis develops. This leadership style works best when followers are highly experienced in their work, but it can result in employee apathy, inefficiency, chaos, and job dissatisfaction.[14] While the laissez-faire style may not be perceived as empowering, it does allow followers an opportunity to empower themselves and result in an increase in team learning.[10]

Transactional Leaders

Transactional leaders focus on the daily operations of an organization and develop an exchange relationship with their followers. The transaction entails rewarding followers when they perform and correcting them when necessary. Transactional leaders focus on getting things done and satisfying their own and their followers' self-interests.

Transformational Leaders

Transformational leaders use approaches that change or transform individuals. They inspire and intellectually stimulate followers and recognize their contributions. Expectations are high and often challenge followers' assumptions about what can be attained. They communicate an organizational vision to their followers, moving them to accomplish more than expected. Their focus is long term and involves developing people and organizations. The more followers perceive their leaders as transformational, the more motivated and empowered they feel in decision making.[14]

Authentic Leaders

Authentic leaders are transparent and ethical in their dealings with followers. They are genuine, empathic, reliable, and believable. They are perceived by others to be open, optimistic, warm, and respectful. They focus on establishing relationships that embody trust and show commitment to the development of their followers.

Shared Leadership

A type of leadership associated with work teams is shared leadership, an approach in which employees are empowered to distribute leadership responsibilities broadly within a group. They lead one another to achieve a goal. Shared leadership is effective with professionals and with project-focused workgroups. It is highly interactive and enables employees to develop their skills and professionalism.

CASE STUDY

The case study is a clinical nurse leader who applied all three types of clinical leadership characteristics (clinical, follower/team, and personal qualities) to address a difficult patient/family situation.

Case Presentation

We had a very long-term patient in our medical/surgical intensive care unit (ICU) who was with us from early October until January 1 when he died. He had amyotrophic lateral sclerosis and a very aggressive, untreatable cancer, but he and his family were not willing to accept his diagnosis and, thus, kept him as a Full Code. His mind was intact until the last few days when he developed renal failure.

His wife was very difficult, constantly criticizing our care, constantly "checking him over," looking for a sheet crease or something to pin his deterioration on. She was so difficult that most nurses gave up trying to even talk to her.

I spoke with my manager, who challenged me to understand her and to have her understand us and his prognosis. I remember telling my manager that I didn't need any more challenges, but I ended up taking it on! I spoke with all his doctors (even those who had "checked off" the case to understand their position[s]) and used the Social Services and Case Management teams of nurses/social workers. I finally spoke with him alone to see what his end-of-life decision(s) were, and I spoke with his wife alone. He and she both wanted to maintain the Full Code status, so we then discussed his probable course. It took many conferences with his wife before she came to trust me and eventually called me "his favorite nurse." It taught me that patience is crucial, and that was not something I thought I had in my arsenal!

His room had a small window, but he hadn't been outside in many months other than his transfer from the ambulance from his rehab center to our hospital in October. The respiratory therapist and I decided to take him outside for some sun. We cleared it with the doctors, the charge nurse, and finally with the patient. He was terrified, and I explained we'd bag him while he was outside, and he could then see life outside. He agreed. It was a major undertaking, but he smiled in the slightly overcast day. We bundled him in warm blankets, and he was out there for about 15 minutes with the wind blowing his hair, and he beamed. His wife was thrilled and asked if we could do it again, so we repeated the adventure the following day with her. That day was sunny, so we stayed out longer. We had four to five trips outside over the next 2 weeks.

His deterioration was substantial after Christmas; his code status was changed to No Code, and she asked for a priest to come to give him a final blessing. Eventually, she agreed, on January 1, to take him outside, off the ventilator, and allow him to go in peace in the sun where he had enjoyed some last pleasant days. It was a rainy day, but the sun came out for an hour and a half. He breathed for 45 minutes and had his family (his real family, his hospital family of RNs, and respiratory therapist, who had been with me on our first venture outside) around him when he finally passed away. It was one of the most beautiful experiences of my life and one I've learned a lot from!

Case Analysis Questions

1. What characteristics of clinical leadership did this RN show?
2. What interrelated concepts are illustrated through this example of clinical leadership?
3. What was the effect of this clinical leader's actions on the client and healthcare team?

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CONCEPT 39

Evidence

Ingrid C. Hendrix

Evidence is a ubiquitous term in health care and society as a whole. Public fascination with forensics and police and legal proceedings has proliferated in the media. Evidence uncovered at crime scenes or in autopsy rooms is vital to solving cases. Evidence can describe the course of events leading to a crime and solve the riddle of who committed it. Evidence serves a similar function in health care as it does in the legal system. It provides confirmation or substantiation of the usefulness of an intervention, the projected course of a disease, or the link between environmental insults and illness. Evidence has taken center stage during the COVID-19 pandemic, where scientists, government and local officials, and the public were clamoring for evidence to guide their approach to safety and public health.

The phrase "evidence-based" is applied to every health discipline: evidence-based medicine, evidence-based nursing, evidence-based dentistry, and the more inclusive evidence-based practice or evidence-based health care. But what is evidence? This concept presentation examines evidence broadly and includes how the term is defined, describing the various forms of evidence and the way it is used in health care. Understanding approaches to recognize and classify evidence in clinical or educational situations helps incorporate evidence in useful and meaningful ways.

DEFINITION

The concept of evidence is probably most closely associated with law and the sciences. In the legal system, evidence is used to establish guilt or innocence. In the sciences, evidence establishes expected benefit or harm. Evidence is defined as *a testimony of facts tending to confirm or disprove any conclusions, or something that furnishes verification*. When used as a verb, evidence means to attest or prove. These definitions describe most aptly why evidence-based practice (EBP) is so fundamental to health care. Evidence supports or disputes the efficacy of a treatment, the use of a diagnostic tool, the transmission of a disease, or any number of scenarios relevant to health care. Similarly, in the legal arena, evidence is a highly regarded and essential element in judging a situation. Evidence is "…the available body of information indicating whether an opinion or proposition is true or valid."[1] Distilling this definition into its key elements, evidence is information that determines whether a proposition (or hypothesis) is accurate. Synonyms for evidence include affirmation, attestation, confirmation, corroboration, data, documentation, information, substantiation, and testimony. However, evidence is more than just data or documents. Data information that is expressed as numbers needs context for meaning. Data becomes evidence when a hypothesis, or argument, frames its meaning.[2] Examples of this definition of evidence in forensic and legal arenas can be witness testimony, phone records, toxicology reports, or DNA samples. In clinical practice and health research, evidence is usually exemplified by research studies. Clinical experience and expert opinion can be considered as evidence, but these forms of evidence are usually given less merit because of their subjective nature.

Evidence-based nursing has been defined as "*an integration of the best evidence available, nursing expertise, and the values and preferences of the individuals, families and communities who are served*."[3]. Scott defines evidence-based nursing as "an ongoing process by which evidence, nursing theory, and the practitioners' clinical expertise are critically evaluated and considered, in conjunction with patient involvement, to provide delivery of optimum nursing care for the individual."[4] A commonality among these definitions is the use of evidence to guide practice while incorporating key elements of patient involvement and the expertise of nurses.

SCOPE

Consider the scope of evidence as a range from the discovery and generation of evidence on one end of the spectrum to the delivery of care at the bedside on the other end (Fig. 39.1). Discovery of evidence is often referred to as "bench" research when discovery is on a molecular or cellular level. Moving bench evidence to studying its application in clinical practice is known as translational research, commonly referred to as "bench to bedside". This is a bidirectional process because the focus of bench research is based on clinical problems observed, and advances in clinical practice are dependent on

bench research. In health care, research can be done by an individual, but recently greater emphasis and value have been placed on collaborative and interdisciplinary research, particularly with translational research efforts.

ATTRIBUTES AND CRITERIA

An attribute is a quality or characteristic that is associated with the concept that helps to clarify or confirm the concept. Major and minor attributes of evidence exist, as shown in Box 39.1. Major attributes of evidence include replicability, reliability, reproducibility, and validity.

- *Replicability:* Evidence is built on research findings. Findings can only be verified if they can be repeated. If other researchers are unable to achieve the same results using the same methodology as the original study, the evidence presented by that study is called into question.
- *Reliability:* To be reliable, results of a study must be able to be reproduced when performed repeatedly under the same conditions. Even clinical experience, as a form of evidence, must demonstrate that the same treatment applied to similar patients over time leads to similar outcomes.
- *Reproducibility:* This occurs when another researcher obtains the original researcher's data and uses it to regenerate the findings. Initiatives such as open science mandates, where the original data is made freely available, facilitate this sharing of data to strengthen the evidence base.
- *Validity:* For evidence to be valid, it must successfully measure what the study set out to measure. For example, a test designed to measure intelligence may actually be measuring the subjects' ability to remember a fact, and so is not a valid measure of intellect.

FIG. 39.1 Scope of Concept: Evidence. Scope extends from the discovery of evidence to the application of evidence into patient care through patient care standards.

BOX 39.1 Major and Minor Attributes of Evidence

Major Attributes
- Replicability
- Reliability
- Reproducibility
- Validity

Minor Attributes
- Publicly available
- Understandable
- Useable

Minor attributes of evidence include that it is publicly available, understandable, and usable.

THEORETICAL LINKS

Various models of EBP have been developed to help nurses understand how to incorporate evidence into nursing practice, provide structure for EBP implementation, and promote sustainability and success.[5] Some models address EBP from the standpoint of an individual, whereas others address it from an organizational viewpoint. Four of the most commonly cited models are The Advancing Research and Clinical Practice Through Close Collaboration (ARCC) Model, the Integrated Promoting Action on Research Implementation in the Health Services (i-PARIHS) Framework, the Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines, and the Iowa Model for Evidence-Based Practice to Promote Quality Care. Two of these models are presented here.

The Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines

This model provides a systematic approach to applying evidence in the clinical, research, and educational settings.[6] Developed in collaboration with clinical and academic nurses, the Johns Hopkins model uses a mentored, stepwise approach called the PET Process, standing for the three phases of the model: The *P*ractice Question, *E*vidence, and *T*ranslation. The model addresses three common barriers to implementing EBP in nursing—lack of knowledge, overwhelming amounts of information, and time constraints. The 2022 revision incorporated user feedback to make the guide clearer. It provides staff nurses with a robust set of tools to facilitate gathering and evaluating evidence, developing a plan of action, implementing changes, and sharing outcomes.[6] The key elements of this model are individual mentoring and support from nursing leadership.

The Iowa Model of Evidence-Based Practice

The Iowa model takes a broader and more institutional approach to implementing EBP.[7] The flowchart of the model begins with identifying the triggering issue. The trigger is initiated by a clinical problem, which leads to a statement of purpose to guide the project. Nurses can easily follow the steps of the flowchart to identify if there is a sufficient evidence base to guide a change in practice, to determine steps to take if there is insufficient evidence, and to establish outcomes to monitor after initiating a change. Another unique element of this model is consideration of the relevance of the question to the organization, which in turn guides the level of support that can be expected when piloting, adopting, and instituting the projected change and evaluating outcome data. The 2017 revision of the model provides even more feedback loops and additional information about piloting the project, sustaining changes, and involving patients.[8]

CORE COMPETENCIES

Evidence

- Formulate an answerable clinical question to guide literature searching.
- Demonstrate efficiency and efficacy in utilizing search engines by selecting appropriate information retrieval systems and incorporating Boolean logic.
- Critically appraise evidence found in primary research articles to assess applicability to patient care using methodology specific checklists.
- Demonstrate an understanding of the research process and describe the types of research methodologies (quantitative, qualitative, mixed methods) and their appropriate application to a particular study design.
- Apply levels of evidence to research articles to gauge trust in the results.
- Incorporate best available evidence in patient care activities and to effect improved changes to practice.
- Communicate research findings utilizing open access methods to disseminate evidence equitably.

CONTEXT TO NURSING AND HEALTH CARE

To provide safe, quality care, nurses must base their practice decisions on evidence. The context of evidence in nursing is nurses using the available evidence and producing new research evidence.

Origins of Evidence

Examining the origins and definitions of the phrase "evidence-based" is useful in determining the meaning of evidence within the context of health care. Although there has been a recent emphasis placed on the use of evidence in clinical practice, this is not a new phenomenon. Examples of evidence-based medicine and evidence-based nursing can be found throughout history. One historical example is illustrated by the discovery of the link between an absence of handwashing and the transmission of infection. In the 1800s, Ignaz Semmelweis, a physician, was alarmed by the high rate of childbed (i.e., puerperal) fever in women delivered by physicians compared with those attended by midwives.[9] Semmelweis questioned the cause of this disparity, an essential element in uncovering the evidence to prove or disprove his theory. He observed the women dying of this fever were attended by physicians and students who had previously been in the dissection lab. These physicians and medical students did not wash their hands after working on cadavers and were spreading contaminants from the cadavers to the laboring women. The mothers who had a lower rate of puerperal fever were attended by midwives who did not attend the cadaver lab. Semmelweis did not purposely randomize the women but, rather, discovered the difference between the two groups through observation. Upon instituting mandatory handwashing with a dilute chlorine solution, the puerperal fever rates dropped precipitously.[9] He questioned existing and entrenched practices, examined the variables involved, and then changed practice based on the evidence he uncovered.

Florence Nightingale is well-known for her work in establishing the nursing profession and being instrumental in hospital reform. Her work and writings provide a classic example of evidence-based nursing. She used observations and statistics as evidence to support her demand for improved hospital conditions to reduce infections and mortality.[10] Nightingale began evidence-based reporting during her work in the Crimean War, but she continued throughout her career to incorporate evidence in lobbying for hospital design reform, patient record systems, nursing care, and patient outcomes.[11]

The more recent emphasis on using evidence to guide practice came from Dr. Archie Cochrane, a British epidemiologist who called on the medical profession to incorporate more evidence, in the form of randomized controlled trials, into the care of patients. He was concerned that many healthcare professionals were not implementing evidence from research that could improve patient care and instead turned to colleagues for information or relied on historical methods of treatment. His advocacy led to the creation of the database which bears his name, the *Cochrane Database of Systematic Reviews*.[12]

Types of Evidence

An expectation of the professional nurse is to incorporate evidence into his or her practice. Evidence can present in many ways. It is important to recognize and understand the various types of evidence as well as the quality of evidence. Evidence created from research studies presents in two major ways: through primary and secondary literature.

Primary Literature

Primary literature constitutes original research studies on which the secondary literature is created. Two broad types of primary literature represent research studies that are the building blocks of evidence: quantitative research and qualitative research.

Quantitative research. Quantitative research focuses on collecting numerical data and analyzing it to explain a particular phenomenon. This type of research focuses on quantities, or things that are measurable, such as the number of visits to an emergency room. Some examples of the types of studies that make up this category include randomized controlled studies, cohort studies, longitudinal studies, case–control studies, and case reports.

Randomized controlled double-blind studies are considered the "gold standard" for quantitative research. The reason is that the methods used to conduct these types of studies introduce the least amount of bias. Patients are randomly assigned to the experimental or control group, and subjects are "blind" to the intervention. When neither the researchers nor the subjects know which intervention they are receiving, this is known as a "double-blind" randomized controlled study. Minimal bias in research studies allows the consumer of this information to have more confidence in the evidence created by that research. As Gugiu explains, "by 'credible evidence' we mean results for which the study design, conduct, and analysis has minimized or avoided biases that would otherwise raise doubt in their veracity beyond a reasonable doubt."[13] Other study designs introduce more variables and, thus, the potential for increased bias. For example, case reports describe an individual patient, making it difficult to draw meaningful conclusions to other patients.

While they represent a lower level of evidence, they are often the first reporting of new trends or diseases.

Qualitative research. Qualitative research answers questions that cannot be answered using a quantitative study design. Qualitative research focuses on a person's experience and the meanings connected to them. This type of research design uses analysis of textual, or nonnumeric, data, such as interviews, surveys, or observation. Examples of qualitative study methods are ethnography, phenomenology, grounded theory, and case study.

Mixed methods research. Increasingly, mixed methods studies are being conducted that combine both quantitative and qualitative approaches. These types of studies can corroborate and confirm the findings between the two methods. By using the strengths of both methods, it provides varied perspectives and a more holistic approach.[14] As an example, quantitative data could supply the evidence as to how often a service is used, and the qualitative data enhances these results by providing the experiences of patients using that service.

Voices of evidence. It is worth noting that an emphasis on evidence derived from research studies, ideally created with minimal bias, centers on and privileges certain people. With an increased interest and need in centering patient preferences, experiences, and values in guiding healthcare decisions, drug development, and research direction, challenges to evidence-based standards are arising. Illustrative of this are issues surrounding evidence creation related to drug policies such as naloxone use by lay bystanders.[15] Initiatives such as the Health Experiences Research Network aim to integrate patient voices into research and "prioritizing topics that are specifically relevant for racial justice; learning about how health experiences and inequality intersect; and continually challenging white privilege within our network."[16] Another approach to community engagement in research is community-based participatory research, which involves community members and researchers working in partnership to address health disparities. It is designed to accelerate the translation of research to communities and focuses on establishing programs that are relevant and sustainable.

Secondary Literature

Busy professionals tasked with providing evidence-based care face an enormous body of literature to guide their practice. This information explosion in the health sciences has led to the development of several types of secondary literature designed to summarize findings from individual or multiple studies. Three categories of secondary literature are evidence summaries, systematic reviews and meta-analyses, and practice guidelines.

Evidence summaries. Evidence summaries are classified as secondary literature because they summarize original research studies. Summary publications have emerged in recent years to address the explosion of information and timely incorporation of evidence into practice. Publications such as *Evidence-Based Nursing, Worldviews on Evidence-Based Nursing,* and *ACP Journal Club* review individual studies and summarize the results for their readers.

Systematic reviews and meta-analyses. Systematic reviews and meta-analyses provide a synthesis of quantitative evidence.[17] Systematic reviews include the available evidence on a topic in the form of randomized controlled trials that are summarized using a systematic methodology. Rather than conducting one very large study, the results of many studies, usually randomized controlled trials, are evaluated and a conclusion is drawn about the effectiveness of a particular treatment. The number of systematic reviews is expanding with initiatives such as the Cochrane Collaboration, the Campbell Collaboration, and the Joanna Briggs Institute. Topics found in a systematic review tend to focus on areas of research that would be of the most interest to the greatest number of practitioners. "Living" systematic reviews are a relatively recent research type in which reviews are updated as new evidence comes out, with a commitment to regular updates and continuous scans of the literature. Meta-analyses (which are similar to systematic reviews) summarize evidence from multiple studies. What differentiates a meta-analysis from a systematic review is that it focuses on combining the statistical results of numerous studies and analyzes that evidence. The proliferation of systematic reviews and meta-analyses is a cause of concern as not all these authors follow the systematic and rigorous processes which were the original hallmark of these types of studies or publish redundant studies.[18,19] As with all research produced, critical appraisal of any study is key.

Practice guidelines. Practice guidelines are another type of summary publication. They are designed to summarize findings of the research and advise practitioners on the current standard of care. Ideally, guidelines result in a faster integration of new evidence into practice and address issues of cost and variation in practice. Guidelines are often developed by government agencies or societies, such as the U.S. Preventive Services Task Force, the American College of Obstetricians and Gynecologists, or the National Association of Pediatric Nurse Practitioners. These organizations create guidelines by using evidence from the literature in the form of research studies and expert opinion to craft the publications, and, as new evidence emerges, they are reviewed and updated. Practice guidelines are considered the standard of practice for a particular treatment. Unlike systematic reviews or meta-analyses, practice guidelines are less structured in their design. Databases, such as PubMed, have the option to limit a search to practice guidelines. Some associations post guidelines on their websites.

Levels of Evidence

Unfortunately, not all evidence produced is of equal quality. Conclusions drawn from research are not necessarily valid just because they originate from a research study. Levels of evidence have been created to help guideline developers and busy clinicians determine the quality of a study. Hierarchies, based on how much trust can be placed in the results of a study design, have been developed. Fig. 39.2 provides an example of general categories and relative strength and quality of evidence. Unfortunately, there has been no standardization; therefore, different organizations have created their own levels of evidence based on different research questions, such as treatment or prognosis. Initiatives such as GRADE (Grading of Recommendations,

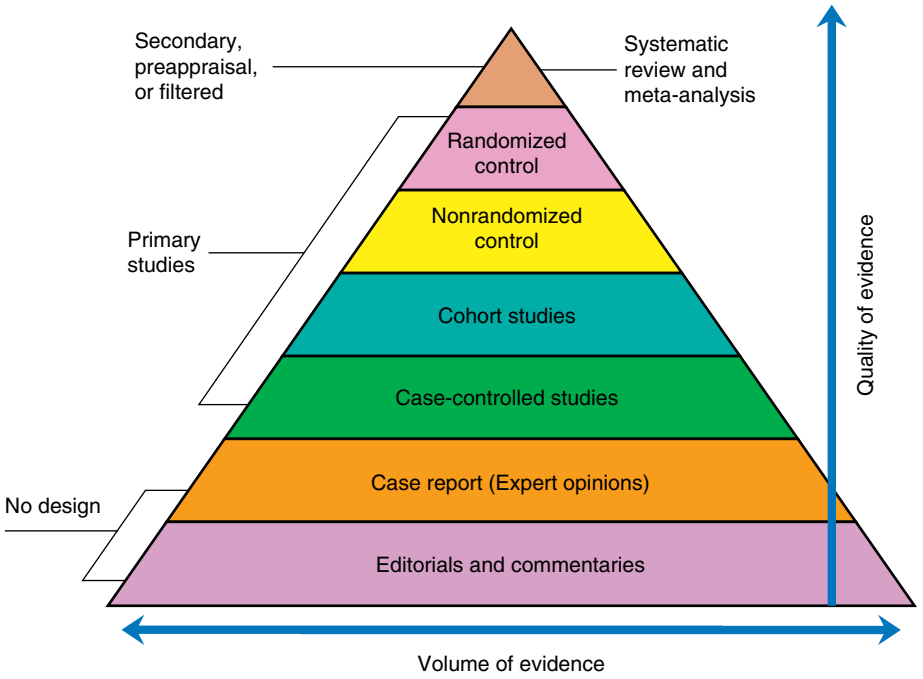


FIG. 39.2 Categories and levels of evidence. As the level or quality of evidence increases, the volume of available evidence decreases.

Assessment, Development, and Evaluation) provide a framework for measuring the quality of evidence of research studies and the strength of the recommendation for a course of clinical care.[20] This widely used system classifies studies as strong or weak based on the methodology of the study—such as sample size and blinding of the researchers and/or study subjects. Designed as a tool for developers of systematic reviews and guidelines, the system is useful for anyone trying to appraise the evidence presented in individual studies. For quantitative studies, numerous websites show detailed tables of what has become known as levels of evidence.[21,22] Levels of evidence provide an evidence hierarchy, with items at the top showing study designs that promote the least amount of bias, to the ones at the bottom being most subjective in the evidence they provide. The design of qualitative studies makes them less well suited for categorization into these levels of evidence, but articles and free online checklists are available to help guide readers in evaluating these types of studies.[23,24]

Another level of evidence is applied to secondary literature, particularly practice guidelines. In this context, a grade or level is assigned to a recommendation to help a healthcare professional understand how well the recommendation is supported by the collective research. For example, the U.S. Preventive Services Task force has a grading of evidence A, B, C, D, and I (Box 39.2)

Evidence on the Internet

Levels of evidence are designed to be applied to original research studies—the primary literature. With the exponential growth of published research studies, many healthcare professionals look to search engines such as Google to find the information that they need. This can be a risky practice. Anyone can post information on the Internet and create very authoritative-appearing websites, even if the information provided is false or misleading. The proliferation of misinformation and disinformation has made it challenging for anyone searching the Internet to establish fact from fiction. Checklists and tutorials help individuals evaluate the credibility of online health information.[25] Currency is an important element of information found on the Web, especially in regard to health information. Check the date the website was last updated, usually found at the bottom of the page. Determine the author and sponsor of the information to gauge their possible biases. This is not always easy to discern. Looking at the *About Us* or *Contact Us* page of a website can provide clues. As with research studies, information found online should limit bias as much as possible. For example, if the information about a particular drug is provided by the pharmaceutical company selling that product, it is important to evaluate that information with such a bias in mind. Looking at a website's domain can help determine the source of the information—for example, *.edu* for educational institutions or *.gov* for government websites. Determine who is providing the content of the website. Is it a healthcare professional, a concerned individual, someone selling something, or a government agency, and are they providing facts or opinions? Content on a website should be validated with evidence, such as references to research studies. Otherwise, the information should be considered opinion. Nurses are key players in helping patients navigate the misinformation on social media platforms and websites. Being able to critically evaluate sources is crucial to providing accurate information sources to share with patients and other members of the healthcare team.

Nurses as Researchers: Evidence Discovery

Nurses play a vital role in the production of research due to their unique role in the healthcare ecosystem. Involvement may include leading a research study as a principal investigator,

BOX 39.2 U.S. Preventive Services Task Force Grading of Evidence

Grade A = Recommends
- There is high certainty that the net benefit is substantial.

Grade B = Recommends
- There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.

Grade C = Selective Recommendation
- Selectively offer or provide the service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.

Grade D = Recommends Against
- There is moderate or high certainty that the intervention has no net benefit or that the harms outweigh the benefits.

I. Statement = Insufficient Evidence to Recommend for or Against
- The current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.

From U.S. Preventive Services Task Force. (2023). *Grade Definitions After July 2012.* Retrieved from https://www.uspreventiveservicestaskforce.org/uspstf/about-uspstf/methods-and-processes/grade-definitions#july2012

being a collaborating investigator on a study, or contributing to a study through data collection. Leading research studies requires a specific skill set acquired by completing graduate education at the doctoral level and following research protocols outlined by an institutional oversight committee, such as an institutional review board. Most researchers are affiliated with an academic health sciences center, private organizations and foundations with dedicated research departments, or government agencies dedicated to research.

Quality improvement projects differ from research studies in a number of ways. The aim of quality improvement projects is to improve patient care at the local level (i.e., hospital units) and the improvement is based on current knowledge rather than creating new knowledge. A familiar model for QI projects is the PDSA (Plan, Do, Study, Act). There is seldom outside funding involved, and the methodology is iterative rather than following a rigid protocol. Institutional Review Board approval is not always required for quality improvement projects, but it varies with the project and the institution.

Nurses as Consumers of Evidence

All nurses must be skilled as consumers of evidence. Understanding research designs and learning to incorporate high-quality evidence into practice can make creating nursing research a less daunting endeavor. For nurses, being a consumer of the evidence generally assumes two forms: (1) practice policies and procedures and (2) finding solutions to practice problems.

Policies and Procedures

Policy and procedure manuals in healthcare agencies outline the practice standards for various care activities; nurses are expected to follow policies and procedures for the agency in which they practice. Policies and procedures should be regularly updated to reflect the current evidence and standards of practice and approved by a committee charged with this oversight. Nurses have a role in developing and maintaining policy and procedure guidelines by serving on such committees or volunteering to participate in updates. In this context, nurses must be skilled research consumers to make accurate and efficient recommendations for policy updates.

Finding Solutions to Practice Questions or Problems

There are many occasions when practicing nurses identify practice-related problems that require solutions. Nurses should use available evidence to systematically approach a question of patient care. Repeatedly following the steps of EBN will facilitate its use and are outlined as follows:

1. Develop an answerable question.
2. Search the literature to uncover evidence to answer the question.
3. Evaluate the evidence found.
4. Apply the evidence to the practice situation.
5. Evaluate the outcome.
6. Share the outcome.

Step 1: Develop an answerable question. The first step in finding evidence is creating a question to ask. This may seem straightforward and obvious, but this step is an obstacle for many people. Most people start searching for information, or evidence, with only a vague idea of what they are seeking. It would be similar to searching for someone's house and knowing only that the person is located in the southeast part of town. One could spend days trying to find the exact location with such vague directions—and one would probably quit the search without success. To find the most direct route, one must start with a good map. A good map begins with the question, "Where do you want to go?" The best way to find evidence is to be clear about what information is needed. The question needs to be specific or answerable without being too vague or so specific that the probability of finding information about the topic would be unlikely. Entering a search query such as "breast cancer" or "diabetes" would lead to an overwhelming abundance of information. What particular aspect of breast cancer or diabetes is of interest: treatment, supportive services, or prevention strategies? Before searching for the evidence, define the question to be answered and map a strategy to get there.

There are two types of questions to consider, background and foreground questions. Background questions are those that provide foundational knowledge. An example of a background question is "What is scleroderma?" These types of questions can most easily be answered by a textbook, review article, or a reputable website. Foreground questions address issues of a more specific nature, such as "Is drug *x* more effective than drug *y* in treating scleroderma?" These questions are best answered by searching the primary literature, which is found in databases indexing research studies, such as PubMed or the Cumulative Index to Nursing and Allied Health Literature (CINAHL).

A strategy that can be helpful in designing an answerable foreground question is using the PICO formula. The acronym

stands for *p*opulation, *i*ntervention, *c*omparison, and *o*utcome. Defining these elements clarifies the question. The following is an example of a PICO question: "For inpatients (P), is turning every 2 hours (I) more effective than air mattresses (C) for preventing pressure ulcers (O)?" Another formula used to develop an answerable question is the PICOT formula. The difference here is the addition of the T, which represents time. This represents the time frame in which the patient or population of interest is observed to determine whether the outcome of interest is achieved. The following question is an illustration of the PICOT formula: "In new mothers (P), do home visits by a nurse practitioner (I) versus no home visits (C) decrease the incidence of child abuse (O) in the first year postpartum (T)?" For qualitative studies, the SPIDER formula was developed to provide a systematic approach to searching for qualitative research studies. SPIDER stands for *S*ample, *P*henomenon of *I*nterest, *D*esign, *E*valuation, and *R*esearch type. A qualitative research question such as "What are the experiences of incarcerated men who self-harm?" would be translated into the SPIDER formula, where the sample is incarcerated men; the phenomenon of interest is self-harm; the design would be questionnaires, surveys, or interviews; the evaluation would be attitudes, views, experiences, or feelings; and the research type would qualitative or mixed methods. These elements more accurately reflect the design of a qualitative study than does the PICO formula that was created to help design quantitative research search strategies.

Step 2: Search the literature. Once a question is developed, the next step is searching the literature. With a question mapped out, it is easier to determine which key words to use in the search. Including synonyms for terms will help expand a search by combining them using the OR Boolean operator, i.e., ambulatory OR outpatient. Use the Boolean operator AND between key words to narrow a search, i.e., nurses AND advocacy. Quotes around phrases search for those words next to each other, such as "kangaroo care." Healthcare professionals use many acronyms; spelling out abbreviations can avoid unrelated articles. For example, a search on the topic "AIDS" will result in articles discussing hearing aids or walking aids, in addition to articles on the disease. Searching the phrase *acquired immunodeficiency syndrome* will retrieve articles focused on the disease. If retrieval is too limited, remove a key word of less importance to the question. A large retrieval can benefit from limits such as language, age groups, or dates of publication.

It is virtually impossible to keep current with new findings and different approaches to patient care. On the topic of evidence-based nursing alone, the number of articles in the PubMed database has expanded from 1 in 1996 to 38,279 in 2022. Bibliographic databases are designed to help access and catalog the rapidly expanding body of literature and provide multiple options for fine tuning results, such as age groups or study design. However, it is an imperfect system. There are many databases with different focus areas, and each has a different search engine, or interface, to learn. As a result, many clinicians resort to Google or Wikipedia because of the fast, user-friendly interfaces. However, there are drawbacks to using search engines such as Google. The amount of information retrieved is usually quite large. Using Google Scholar, a subset of Google, somewhat reduces the volume of information retrieved, but results are still sizeable. This can be beneficial for an initial search to discover how much is available on a topic, develop key words, and to find hard to locate articles. The algorithms programed into search engines which deliver the results of a search have been shown to be biased and prejudicial.[26] As computer programs they may seem objective, but as they are designed by humans, those programmers and for-profit corporations can introduce their own bias into their creation. Being a thoughtful and critical consumer of information is vital to being an informed and digitally literate healthcare professional.

Using databases specifically focused on healthcare research is more efficient, but it requires some training. Most searchers use only key words, but using the subject heading search feature of a database can significantly narrow a search and yield more targeted results. Consulting with a medical librarian or using tutorials provided by the database producer or a health sciences library saves valuable time in locating evidence to guide practice. Searching the literature is more an art than a science, and it requires creativity and perseverance. As with any skill, practice will increase satisfaction with the outcome.

Step 3: Evaluate the evidence found. Once information has been located as evidence for a change in practice, that information should be evaluated for its quality and applicability to a particular patient situation. The following questions are commonly used to evaluate studies: Are the results of the study or systematic review valid? What are the results, and are they meaningful and reliable? Are the results clinically relevant to my patients? *American Journal of Nursing* has created a website compiling articles from their journal to help nurses assess the quality of the information found in research studies.[27] The American Medical Association has also published the book *Users' Guides to the Medical Literature,* which is a compilation of articles from *Journal of the American Medical Association* covering topics on how to read and understand the information found in published studies. As stated previously, not all evidence is created equal, and nurses need to be critical consumers of the information they uncover. By reading these sources, nurses can improve their skills in critically evaluating the literature.

Step 4: Apply the evidence found. If sufficient evidence is found to guide a change in practice, the next step of EBP is to apply that evidence to a particular patient's situation. Although evidence provides proof of the validity of a course of action, it is not the sole reason for treatment decisions. A key element in any practice situation is the incorporation of patients' preferences for their health processes and outcomes: "Nurses play a pivotal role in empowering patients, engaging them in their care, and ensuring that they are fully activated to be personally accountable for their own health."[28] An individual should be provided with the evidence and advice of a well-informed healthcare professional to support his or her decision choose the care he or she desires. Empowering patients with evidence can shift the power dynamic so that decisions are collaborative, potentially increasing patient's motivation and care outcomes. It is the responsibility of the healthcare professional to use the most appropriate and current evidence to guide practice and optimize care.

Step 5: Evaluate the evidence. To complete the process, the nurse evaluates the outcome. Evaluation includes appraisal of the degree of success of the intervention and the patient's satisfaction with the outcome in addition to assessment by the nurse of the efficacy of the evidence. Outcomes, both successful and unsuccessful, provide a source of new evidence for others to use.

Step 6: Share the outcomes. Results need to be shared with others so that new knowledge can be incorporated into practice. Dissemination can take many forms—articles, posters, policies, or presentations. This step is often overlooked, but it is important to build the body of evidence on which nursing is practiced and help other nurses avoid duplication of effort.

INTERRELATED CONCEPTS

Many concepts relate to and work in synergy with evidence; in fact, nearly everything in health care is shaped by evidence. In addition to guiding individual practice, evidence also affects health care on a more global scale. Four concepts featured in this textbook have especially important interrelationships: **Safety**, **Health Policy**, **Technology and Informatics**, and **Health Care Economics**. Fig. 39.3 illustrates the multidirectionality of evidence. The arrow pointing outward illustrates how evidence provides the foundation and evolution for these concepts. The arrow pointing toward evidence indicates that these concepts provide evidence to their efficacy; thus, their connection to the evidence is not static. Outcomes inform future research to update previous evidence and, thus, a constant flow of evidence is maintained.

In 2003, the Institute of Medicine (IOM) released the report, *Keeping Patients Safe: Transforming the Work Environment of Nurses.*[29] The IOM used evidence from a variety of industries, other IOM reports, and expert testimony to develop policy recommendations related to nurse/patient ratios, work hours, and overtime—all factors that influence the delivery of safe patient care (**Safety**). Subsequent reports from IOM, such as *The Future of Nursing* continued the call to optimize nursing practice to provide safe care, such as baccalaureate preparation for entry to practice and nurse residency programs. The Agency for Healthcare Research and Quality point out on their Patient Safety Network the importance of nurses to patient safety since they spend the most time with patients and are, therefore, best at alerting the healthcare team to a patients' deteriorating status. They also summarize numerous articles identifying nurse staffing ratios as an essential element in patient safety.[30] Patient safety initiatives and the pursuit of quality health care are all informed by evidence.

Evidence provides the foundation for **Health Policy.** New treatments and diagnostic tests are evaluated by examining the evidence of their efficacy, which policymakers then use to approve their application. Policies developed to guide practice are also based on the best available evidence found in the literature. Policymakers should incorporate all types of evidence appropriate to the topic but also balance the evidence with practical constraints such as values of the community, costs, and ethics.[31] Numerous articles have illustrated barriers to the translation of evidence into policy due to the separate communities that researchers and policymakers inhabit and how politics can often be a greater influence on decisions than evidence.[32-34] Federal agencies and numerous global agencies, such as the World Health Organization and the U.S. Agency for Healthcare Research and Quality, have developed initiatives to improve the uptake of scientific evidence into the development of health policy.[35,36]

Technology and Informatics is another concept closely related to evidence. Technology in the context of evidence allows for increased access to the literature through online databases, web content, electronic books, and online journal articles. Sophisticated search engines provide end users with increasingly intuitive interfaces that are faster and use increasingly sophisticated algorithms to locate information.

FIG. 39.3 Evidence and Interrelated Concepts.

Handheld devices allow information to be accessed from anywhere the user is located. Ideally, evidence informs the use and adoption of technology, with new technology incorporated into practice once it is tested for its validity and utility. The specialty of nursing informatics "integrates nursing science with multiple information management and analytical sciences to identify, define, manage, and communicate data, information, knowledge, and wisdom in nursing practice."[37] Informatics has been the driving force behind such innovations as the development of the electronic medical record (EMR), clinical decision support systems, wearable monitors, and patient portals. Data from these systems and others, often referred to as "big data" for its size, speed of creation, and variety, is a rich source of information to guide local, national, and international efforts at studying and improving patient care. But while such data exists, system silos and platform heterogeneity challenge researchers to combine these gold mines of disparate data into a cohesive and usable database. As different technologies become increasingly ingrained in health care, nursing informatics will be an important skill for nurses, such as understanding artificial intelligence, data literacy, and data privacy.[38,39]

Evidence plays a vital role in **Health Care Economics** through cost containment. Policymakers, governments, institutions, and the public are all demanding evidence to support healthcare resource decisions. One example of the relationship between economics and evidence is research showing that care provided by nurse practitioners, practicing to the full extent of their license, is more economical than care provided by primary care physicians, a significant issue in an era of healthcare reform.[40,41]

CLINICAL EXEMPLARS

An exemplar is a specific example of a concept, and there are literally thousands of evidence exemplars. Although research studies, practice guidelines, and expert opinions are general categories of evidence exemplars, the studies or practice guidelines themselves are the exemplars. For example, in the category of practice guidelines alone, PubMed indexes 29,738 guidelines. Box 39.3 presents common exemplars linked to this concept.

Featured Exemplars

Randomized Controlled Trial

Double-blinded randomized controlled trials are considered the gold standard for evidence related to therapies because these types of studies represent the least amount of design bias. Study subjects are randomly placed (randomized) into either a treatment or a control group of the study, so neither the subjects nor the researchers decide the subject placement, thus reducing the influence of preconceived ideas about the likely outcomes. Double-blinded studies are designed so that neither the researcher nor the subject knows which treatment is being given; thus, they are both "blinded." By removing these sources of design bias, more confidence can be placed in the results of the study.

BOX 39.3 EXEMPLARS OF EVIDENCE

Quantitative Research Studies
- Randomized controlled trial
- Cohort study
- Case–control study
- Case study
- Longitudinal study

Qualitative Research Studies
- Ethnography
- Phenomenology
- Grounded theory
- Case study

Practice Guidelines
- Standards of medical care in diabetes (American Diabetic Association)
- Lipid screening and cardiovascular health in childhood (American Academy of Pediatrics)
- Guideline for human papillomavirus (HPV) vaccine use to prevent cervical cancer (American Cancer Association)

Expert Opinion/Commentaries
- Healthy People 2030

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Longitudinal Study

Studies of a group of people over a specified period of time can be used to detect long-term health changes, such as the effects of exposure to particular environmental factors or lifestyle choices. Groups of people who are exposed and who are not exposed may be observed over time to determine whether their health outcomes differ. The time frame can be as long as decades, as in the case of the Framingham Heart Study, started in 1948, or the Nurses' Health Study, started in 1976.

Ethnography

Ethnographic studies are a type of qualitative research methodology. This type of study has historically been used by anthropologists to study cultural groups, such as indigenous peoples. In health care, the cultural groups can be patients in a particular unit or groups of nurses. A key element of ethnography research is that the researcher studies the group in question over a long period of time and usually will join the group to become a participant observer. Nursing examples of ethnography research include observing interruptions in the work environment of nurses and how Black/African American nurses experience barriers to career advancement.[42,43]

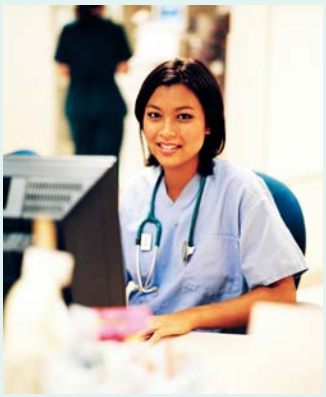
Practice Guidelines

Practice guidelines are recommendations for clinicians on the current best practices for treatment. Guidelines, using the latest evidence available on a particular topic, are usually created by the consensus of experts. They can be developed by government agencies, nonprofit agencies, hospitals, or professional societies. Often, they are sponsored by government agencies to standardize the best treatment available and disseminate research findings as quickly as possible.

Expert Opinion

Opinion is at the opposite end of the spectrum of reliability from double-blind randomized controlled trials due to the inherent bias. Individuals who are considered experts in their field by their peers produce evidence based on their experience. Although experience is an important and valid form of evidence, it needs to be considered in light of how it is produced. Examples of expert opinions are book chapters, review articles, and guidelines.

CASE STUDY



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Case Presentation

Mika Kimura, a registered nurse working in the neurosurgical intensive care unit (NSICU), observes that many of the patients under her care need to be transferred from their beds to wheelchairs. However, most of these patients have very little motor control and are unable to assist the nurses with transfers. As a result, she observes more absences among her coworkers attributable to back injuries. Mika realizes there is a need for change and is curious about how other similar units address this issue. She asks her coworkers who have worked in other units if they have seen a solution to this problem. No one reports a satisfactory solution.

Mika turns to the evidence from the published literature to determine whether anyone has conducted a study to address this problem. The question she develops is, "In intensive care units, specifically neurosurgical ICUs, is there a method of transferring patients that does not cause injury to the nurse?" She starts her search in the PubMed database and types in the key words "neurosurgical ICU," "patient transfers," and "nurses." This yields a few hits but nothing very useful. Thus, she decides to broaden her search to include any ICU, and this time spells out "intensive care unit" and tries the key word of "lift*." By using an asterisk, Mika retrieves articles that use the word *lift* or *lifts* or *lifting* or *lifted*. She omits the word "nurse" because she can still use the information if the article refers to other healthcare employees. She finds a few articles that she wants to examine in more depth, so she links to the full text of those articles and prints them. Later that evening, when it is quieter on the unit, she reads the articles. Mika learns that many hospitals have developed "no lift" policies and have also purchased movable lift devices. One article discusses the cost-effectiveness of using a lift versus dealing with staff absences attributable to back injuries and workers' compensation claims. Mika then determines how many employees in her unit in the past year have missed work because of injuries caused by transfers. Armed with this information, she approaches the unit manager to request that the hospital purchase a lift that can be rolled from room to room. Based on the evidence that she provided to prove her point—both from the literature and from hospital injury reports—Mika's request is approved, and a lift is purchased. Not only has she won the thanks of her coworkers, but she also saved the hospital substantial money in lost time from occupational injuries.

Case Analysis Questions

1. Mika exemplifies the idea of nurses as consumers of evidence. Consider the steps in a systematic approach outlined early in this concept presentation. In what way is this consistent with what Mika did?
2. The last steps in a systematic approach are evaluating outcomes and sharing new knowledge. How should it be determined whether the acquisition of a lift has made a difference and how should Mika share her findings?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 40

Clinical Judgment

Ann Nielsen and Kathie Lasater

The delivery of health care and the practice of nursing is very complex. Many individuals have multiple chronic conditions, and healthcare reimbursement has become a major determinant of healthcare practices and policies in the United States. Patients with comorbidities are now admitted to acute care settings for shorter periods of time, and sicker patients are cared for in community-based settings, such as home health and long-term care.[1] There is increasing evidence that nurses often fail to recognize acute deterioration in a timely way, thereby delaying nursing responses and/or referrals and putting patients' safety at risk.[2,3] More than simple knowledge acquisition is needed to support increased recognition and appropriate responses.[2]

Due to increasing complexity in health care, nurses must provide care in environments in which patients' conditions may be changing rapidly. Nurses in acute care settings must prioritize, or "restack," patient care activities multiple times throughout a shift.[4] This restacking involves reprioritizing nursing care activities, assignments, responding to changing patient conditions, and doing multiple discharges and admissions, sometimes in environments with staffing challenges. To restack activities, nurses engage in a thinking process that results in crucial decisions or judgments about patient care, often with little time to think about or plan for the next steps. In the community, nurses work independently with patients to address health needs in situations where resources may be limited and creative solutions and adaptations are needed, which also requires skilled decision making and, therefore, clinical judgment.

The foundation of safe and effective nursing practice is the ability to consistently make sound clinical judgments. The American Association of Colleges of Nursing has identified clinical judgment as an essential competency for nursing education,[5] and the National Council of State Boards of Nursing has incorporated clinical judgment as part of the National Council Licensure Examination (NCLEX).[6] In this chapter, clinical judgment as a concept is presented from a theoretical perspective to help students gain an understanding of the complexities of this process and will be explained using examples. Recommendations for learning this essential skill will be introduced.

DEFINITION

The concept of Clinical Judgment in general refers to interpretations and inferences that influence actions in a clinical practice setting.[7-10] Specifically, the definition of clinical judgment used for this concept presentation is "*an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response.*"[8]

Two other terms, *clinical reasoning* and *critical thinking,* are often used interchangeably in the literature with the term *clinical judgment;* thus, differentiation is needed. *Clinical reasoning* includes all of the thinking processes by which a nurse reaches a clinical judgment.[9,10] It is defined as the "*cognitive and metacognitive processes used for analyzing knowledge relative to a clinical situation or specific patient.*"[10] Encompassed in clinical reasoning is the ability to perceive the relevance of scientific evidence and its integration into the specific patient situation.[7] *Critical thinking* is a cognitive process that is used for analysis of an issue or problem and is knowledge and logic-based but is not exclusive to a specific profession or discipline and is not dependent on a particular situation.[10] Critical thinking is necessary to engage in clinical reasoning, but it is not specific to nursing nor to a given patient, nurse, or care context.[7,10]

Herein lies the complexity of nursing: clinical judgments require that the nurse recognize the unique situation of the patient using knowledge of a wide range of interrelated physiologic and psychosocial concepts, which lead to a deep understanding of the clinical situation. In other words, clinical judgment requires the nurse to use knowledge, both theoretical and practical, for the unique patient situation to make sense of it, to consider patient factors and preferences, and respond appropriately in the specific context of care. Because of the diversity of patient care situations encountered by the nurse, it

should be noted there may be no one right clinical judgment or answer in a given situation.[7]

SCOPE

To understand the scope of clinical judgment, it is essential to recognize some of the other factors that guide patient care (such as evidence-based practice, standards-based approaches, and the nursing process) and how these are related to clinical judgment.

Evidence-Based Practice and Clinical Judgment

Evidence-based practice (EBP) is defined as *a problem-solving approach to clinical decision making that combines the best available scientific evidence with best available patient and practitioner experiential evidence for optimal healthcare outcomes.*[11] All clinicians, including nurses, are expected to use the best evidence to inform practice. EBP is known to improve patient outcomes.[11]

Skillful use of evidence underlies sound clinical judgment, and clinical judgment is an integral aspect of implementation of EBP.[9] Safe and effective application of EBP requires scientific knowledge, as well as practical experience, to understand when particular research evidence is relevant.[7] The nurse must accurately assess the patient and care context to apply evidence that is most appropriate in a given situation. Clinical judgment also guides nurses' use of current evidence to question current practices and consider when guidelines or standards need to be updated based on current evidence.[7,9]

Standards-Based Approaches and Clinical Judgment

Standards of care and patient care guidelines provide clear-cut guidance or rules that standardize approaches to patient care within an institution. They are based on best evidence for practice in a typical patient population and broadly focus on quality of care rather than on the individual patient. These standardized tools are very useful to support safe patient care, especially for the beginning clinician who lacks knowledge and/or experience. However, their use may not result in the best possible care for a specific patient in a given situation. They also may limit options and creative solutions.

A principle that relates decision-making tools to clinical judgment is that if there is a rule or guideline that covers the situation, clinical judgment is not required. However, clinical judgment may be required in decision making about whether or not a given standard is applicable or appropriate in a patient care situation.[7] In fact, research has shown that although standards or guidelines may be useful beginning points, expert nurses rarely rely on them alone.[7,8] Experienced nurses understand that patient care situations are unique; thus, they consider nuances of the unique situation, in addition to their practical experience and knowledge of standards in a more individualized approach to care.[7]

Nursing Process and Clinical Judgment

Nursing process frames the overarching standards of practice of the nursing profession.[12] It is a framework that is used to structure the plan of care that involves assessment, nursing diagnosis, outcomes identification, planning, implementation, and evaluation. Students may notice that nursing process is used in many textbooks to teach nursing care. Because the nursing process and clinical judgment seem to be very similar at first look, it is important that students distinguish between the two. While nursing process is linear and can be useful in systematic problem solving and planning care (often over time), considering care through the lens of clinical judgment allows nurses to examine more deeply the factors that go into clinical thinking and decision making, often in "real time" as patient care is occurring.[8] The nursing process is more static in nature for planning care, whereas clinical judgment is a dynamic process that accounts for changes in the patient situation and informs concomitant nursing responses.

ATTRIBUTES AND CRITERIA

Clinical judgment has four significant defining attributes that are useful in understanding the concept: holistic view of the patient situation, process orientation, clinical reasoning, and ethical comportment.

Holistic View of the Patient Situation

Clinical judgment is inherently complex and influenced by many factors related to the particular patient and caregiving situation, and it, therefore, requires a holistic view.[7,9,12,13] Making sound clinical judgments requires a willingness and ability to consider all factors involved in patient care, including certain characteristics of the nurse (theoretical and experiential knowledge, values, biases), the relationship with patient and patient values, beliefs, and preferences, as well as the context of care, and is much more than simply a combination of the individual aspects.[8] Furthermore, it involves shared decision making with the patient.[9] Patient-centered care is foundational to optimal outcomes;[14] thus, developing a relationship with the patient, encouraging patient engagement in decision making, offering quality patient education, and strong collaboration are nursing skills foundational to clinical judgment.[12]

Process Orientation

Clinical judgment is circular, interactive, and moves fluidly between and among all of the aspects of the process.[7-9] Based on a holistic view of the patient, the nurse *notices* and *interprets* salient (or relevant) features of the specific situation and acts (or not).[8] While observing the patient response, the nurse is considering the next steps. These aspects do not have a linear relationship but rather, continuously influence each other in complex ways.

Clinical Reasoning

Clinical reasoning is an aspect of clinical judgment.[9] Nurses primarily use two types of reasoning: analytic and intuitive.[8-9] The type of reasoning used depends on the caregiving situation and the nurse's previous experience. When a situation is unfamiliar, the nurse (expert and novice alike) tends to rely on analytic reasoning processes, consider the possibilities, and deduce

the solution. With broad and deep experience, the more expert nurse may recognize a situation immediately and intuitively, then act quickly. Nurses may also reason in narrative form. For example, they may use the patient's description of their personal healthcare experience to help understand the meaning of the situation from the patient's perspective.[9] Discussion with other professionals to expand understanding of a situation, another type of narrative reasoning, can enhance the quality of clinical judgments made.[9]

Ethical Comportment

This attribute means that nurses come to a patient situation with an outlook of what is right or good for the patient that manifests in respect, responsiveness, and support toward that patient. This attribute arises from experience and practical learning from others,[10] as well as grounding in personal values. As we consider ethical comportment, it is important to remember that as humans, all nurses (and students) bring biases, both conscious and unconscious, into caregiving situations. Increasingly, the effect of bias on health equity is being recognized. To safely and ethically practice, it is important to enact habits of reflection and self-awareness to manage one's own biases.[15]

THEORETICAL LINKS

The Tanner Clinical Judgment Model, first developed in 2006 and updated in 2022,[8-9] is a comprehensive approach to clinical judgment. Based on three decades of research (focused primarily on expert nurses in practice), it is the most common model used in nursing education.[16] The model (Fig. 40.1) rests on assumptions about complexities in the environment of care and the interplay of multiple factors that affect nurses' clinical thinking. The model describes four stages of clinical judgment (noticing, interpreting, responding, and reflecting). Despite the fact that these stages are described separately, they continuously influence each other in a complex manner. While considering them as separate aspects may be artificial, understanding each stage is a way to better understand clinical judgment as a whole. Making clinical judgments begins with expectations about what the nurse will encounter in a patient care situation.

Expectations

The process begins when the nurse receives initial information about the person or patient. Influenced by the nurse's background, knowing the patient or person being cared for, and contextual factors, the nurse develops expectations about care.[9] Consider the factors listed on the left side of the model that describe the nurse's background (Fig. 40.1). The nurse has nursing knowledge from formal education, textbooks, and/or from clinical practice guidelines for the patient's condition. For example, if a patient has had open heart surgery, the nurse will know about the procedure, common risks and complications, and care considerations for the stage of recovery the patient is in. The more experienced nurse may have relevant experiential or practical knowledge from caring for patients with similar conditions, as well. The nurse also brings personal values regarding patient care, as well as personal biases to the situation.

Knowing the person being cared for influences expectations, as well. Each person or patient is unique and responds to therapies differently. As the nurse gets to know the patient and their unique responses to their condition and therapies, care can be better individualized. Patients also come with their own living situations or circumstances, experiences, values, and preferences. Knowing the patient informs care and facilitates adjusting the approach with respect to their values and preferences so that they can become an active partner in their own care. Without knowing the patient, the nurse uses theoretical, decontextualized knowledge, such as a list of general signs and symptoms for a medical diagnosis or patient care guidelines, that may or may not be useful in a particular situation.

Consider the following example: A home health nurse who has made multiple visits to an older adult in the home over

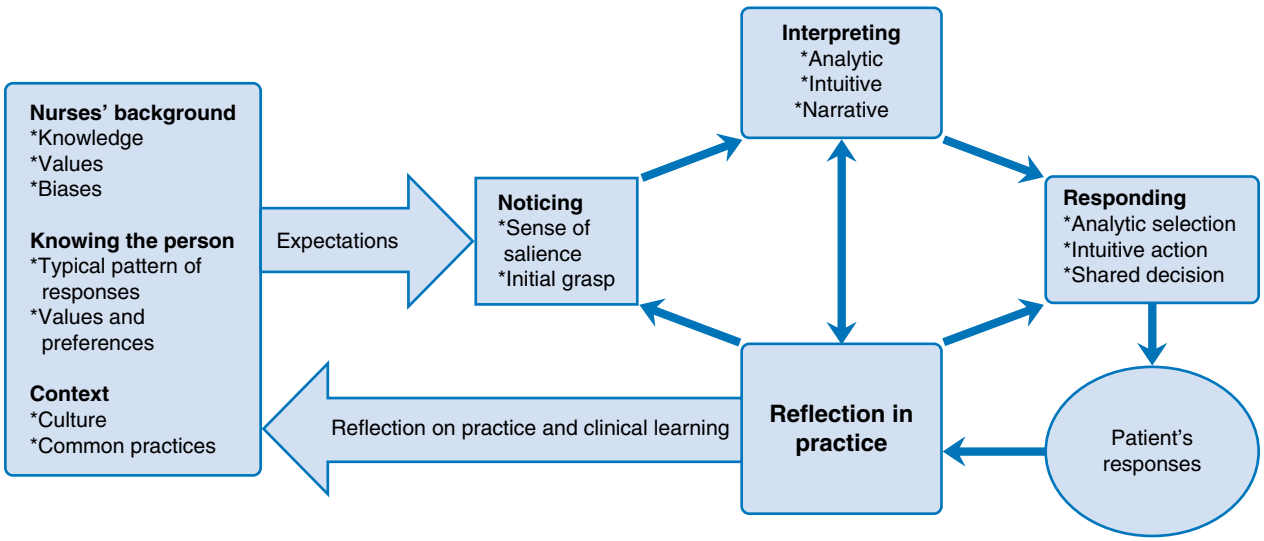

FIG. 40.1 Tanner's Model of Clinical Judgment. (Tanner, C; Messecar, D; Delawska-Elliott (2022). Chapter 13, Evidence Based Practice. In Joel, L (Ed) *Advanced Practice Nursing: Essentials for Role Development* (5th ed.). Reprinted with permission from F.A. Davis.)

several months has a different level of "knowing the patient" than a nurse who sees a patient in an acute care setting for the first time. Knowing the patient and their baseline mental status informs the home health nurse's expectations, setting the stage for recognizing subtle changes in cognition or affect. A nurse encountering this same patient for the first time in an acute care setting lacks an understanding of the patient's baseline mental status and might not recognize medication-related confusion. Instead, the nurse might assume that the patient has dementia or other cognitive impairment. Expectations frame what the nurse *notices* when meeting the patient, and *noticing,* like clinical reasoning, is part of all stages of clinical judgment. For more details on expectations and the precursors to noticing, see Box 40.1.

Noticing

Noticing is critical to making an effective judgment to address a patient issue. Guided and influenced by expectations and patient signs/symptoms, the nurse hones and focuses the assessment and *notices* various aspects specific to the patient care situation.[8,9] When *noticing,* nurses select from a very broad set of data and patient assessment findings, searching for patterns based on previous caregiving experiences or formal knowledge. They use that information to identify issues and guide care in the current situation. Less experienced nurses may have difficulty extracting the most important patient data and findings.[7,17]

Based on what is noticed, the nurse may have an immediate grasp of the situation—recognition of a "pattern" or cluster of cues that signals a concern. On other occasions, the nurse, despite extensive experience, may notice that the situation is not as expected but does not have a clear grasp of it. In this situation, the nurse immediately gathers additional information, drawing on their nursing background, and uses clinical reasoning to determine what information is most needed.[8,9]

BOX 40.1 Factors That Influence Expectations and Noticing

Intrapersonal Characteristics of the Nurse

- Ethical grounding and biases, both conscious and unconscious.
- Intellectual humility. Recognizing what is known and what is unknown, then asking questions/seeking help when unsure.
- Skill in using various ways of knowing—empirical, experiential, and ethical.

Theoretical and Experiential Knowledge of the Nurse

- Novice and less experienced nurses use deductive reasoning, rules, and comparisons of the patient with the textbook in a systematic analysis of the situation.
- Expert nurses look at the whole picture and use pattern recognition and intuition derived from their experiences to make judgments.

Knowing the Patient

- Knowing the range of patient's pattern of responses.
- Knowing the patient as a person, including preferences and desires.

Context or Environment of Care

- Setting in which the nurse interacts with the patient.
- Unique aspects of nursing practice/patient care in a given setting.

Interpreting

Using the particular patient data and comparing it with relevant theoretical and experiential knowledge, the nurse begins to assemble all the information, make sense of it, identify issues, and establish priorities for care.[9] Nurses with less experience use more deliberate analytic reasoning processes to make interpretations, weighing possibilities. For the more experienced nurse, certain data and other aspects of the situation carry more weight than others with respect to the patient. Interpretations may be nearly instantaneous and simultaneous with noticing, the result of intuitive reasoning patterns.[9]

Consider the following example of an experienced nurse in a clinic-based setting, such as an internal medicine clinic. Through honing their cardiopulmonary assessment skills over a number of years, nurses become familiar with the early signs of impending heart failure. A nurse new to that clinic may not readily recognize the pattern of breathing correlated with patient color, including the blue tinge of oral mucous membranes, and complaints of increased fatigue with activities of daily living. The implication of extensive previous experiences may well be faster initiation of treatment for this patient, thereby preventing a hospitalization.

Responding

Once the patient data have been sorted and interpreted, the nurse uses the interpretation of the situation to respond to the particular patient issue through nursing interventions or decides that intervention is not currently needed.[8] Depending on the level of expertise, the nurse may or may not be able to judge the effectiveness of the intervention before initiating it. For example, the nurse knows that the ordered pain medication is likely to help the newly admitted postoperative patient with a pain level of 8 out of 10. What the nurse may not know is what dose will be effective or the level to which it will reduce pain in this particular patient. The nurse's past experience with and knowledge about the effects of the pain medication will initially direct the dosage the nurse chooses. As the nurse comes to understand the unique patient's response to the medication and dosage required, the reasoning process moves from primarily analytic to more intuitive/narrative.

Reflecting

Reflection is a process whereby one thinks about an experience and learns from that experience and one's actions. Intentional reflection at two points is a key component of the clinical judgment model: reflection-in-practice, considering patient responses in real time during patient care; and reflection-on-practice, after patient care occurs.

Reflection-in-Practice

Reflection-in-practice refers to the nurse's understanding of the patient situation while care is occurring.[8,9] In observations and interactions with the patient, the nurse determines patient status and adjusts care accordingly. It is the thinking that happens in "real time" during patient care. Because of the ambiguous and complex nature of clinical judgments and the particular needs of each patient, reflecting is a critical aspect of evaluating the

patient's reaction to the intervention. To continue the example of the postoperative patient, the nurse chooses a pain medication dose based on many factors. While administering the medication intravenously, the nurse is continually assessing and observing the patient's response to medication, such as changes in facial expression, muscle relaxation, or verbal indications of relief. This is an example of reflection-in-practice. If the desired response is not achieved, the nurse may need to reinterpret the data to respond differently.

Reflection-on-Practice

Reflection-on-practice occurs after care of the patient. In reflection-on-practice, the nurse contemplates a situation and considers what was successful and what was unsuccessful. Reflection-on-practice is when significant learning from practice occurs and is critical to the development of increasing skillfulness as a nurse.[9,18-19] In fact, some theorists believe that reflection and the ability to learn from one's actions are marks of a professional.[18] For example, in the situation described previously, the nurse may take some time at the end of the shift to analyze why they acted in a specific way to relieve pain in this particular patient and consider whether their nursing actions were successful and if so, why. Often nurses spend more time reflecting on negative outcomes, but it is equally important to consider successful outcomes to develop and improve nursing practice.[8]

Nurses may use verbal narratives to engage in reflection-on-practice, to make sense of their own experiences, and to process thinking. Listen to nurses in clinical settings when they talk; nurses share their clinical experiences, especially if some aspect of care is perplexing. Telling stories can be a way of problem solving or learning from the experiences of others, including patients.[9]

CORE COMPETENCIES

Clinical Judgment

- "Integrate nursing knowledge (theories, multiple ways of knowing, evidence) and knowledge from other disciplines to inform clinical judgment."[5,p.28]
- Identify salient aspects of the situation.
- Recognize patterns of findings in making interpretations of the situation.
- Demonstrate clinical reasoning in interpretation of situations.
- Engage in shared decision making with the person or patient.
- Respond effectively to the person's or patient's needs.
- Consistently reflect, during practice or caregiving, on clinical actions and adjust as appropriate based on an evolving situation.
- Reflect after clinical practice situations to learn from them.

CONTEXT TO NURSING AND HEALTH CARE

All Nurses, All Settings

Clinical judgment is an integral aspect of nursing care of all patients and patient populations. Nurses in all specialty areas and practice settings—whether in public health nursing, community-based nursing, long-term care, or acute care—exercise clinical judgment; thus, it is considered an essential skill of the professional nurse.[3,5] Clinical judgment, however, is not required for every patient care situation. Some nursing actions are obvious. For example, a postanesthesia recovery nurse knows that it is appropriate to take an immediate postoperative patient's vital signs quite frequently in the first few hours to recognize early signs of a problem. This is based on the nurse's general knowledge that patients can sometimes have breathing or circulatory difficulties following administration of a general anesthetic and surgical interventions. The nurse also knows that the earlier such a sign or symptom is identified, the better the outcome for the patient. Recognition of an abnormal finding and actions taken subsequently are the result clinical judgments.

Environment of Care

As mentioned previously, the context or setting of care influences what a nurse notices and can have a significant influence on care. Demanding environments of care can add increasing burden to making clinical judgments and can actually interfere with competent clinical judgment.[3,4,8,10] On the other hand, context may also be a boon for easing the burden of clinical judgments. For example, consider the case of a patient experiencing a myocardial infarction in the emergency department, where a wide range of medications, including oxygen, are readily available. Monitoring devices are already on the patient and, in fact, may have signaled an impending life-threatening dysrhythmia. Nurses in this context are trained to respond quickly and confidently; they are anticipating emergent situations. In contrast, consider the nurse who encounters a person experiencing a myocardial infarction in a public setting, such as a park or a church. Very different actions must be employed, including deciding what to do first, who should call for help, who should be involved in the resuscitation process, and how to manage the situation outside the acute care setting.

Theoretical Knowledge, Experience, and Expertise

Skilled judgment, or thinking like a nurse, requires deep clinical knowledge and several types of thinking. Experts and novices tend to rely on different types of knowledge. Novice nurses and students rely mostly on formal, theoretical knowledge and tend to consider that all pieces of information have similar importance. For this reason, they may have difficulty determining priorities in a given situation.[7] Early in practice, it is more challenging to individualize and contextualize patient care. In contrast, as nurses become more experienced, clinical judgments become more intuitive, with nurses instantly recognizing patterns and grasping the meaning of situations, then immediately identifying what their response should be.[7-8] As such, it may appear that experienced nurses have not engaged in all aspects of clinical judgment, but, in fact, all aspects may occur almost simultaneously and subconsciously.[8]

The contrast between how experienced and novice nurses make clinical judgments underscores the importance of theoretical grounding and formal knowledge in student nurse practice and beyond. Less experienced nurses need to intentionally prepare for care by accessing resources to learn about information relevant to patient care, for example, the medical diagnoses, common symptoms, typical treatments, and potential urgent or

emergent situations that might arise. Understanding the general principles of nursing care, communication, altered states of health, patient teaching, and other aspects of care is fundamental to nursing. That theoretical knowledge can provide a firm foundation for developing clinical judgment and individualizing patient care in the clinical setting. In fact, one study found that preceptors believed that new graduate nurses were ready for independent practice when they were able to integrate multiple sources of knowing and individualize care to the patient.[13]

Developing Clinical Judgment

Evidence suggests that clinical judgment develops over time with increased knowledge and experience[17] and is a developmental process that begins during nursing school.[20] Nursing education teaches the fundamentals of clinical judgment, including theoretical knowledge, professional skills, and provides practical experience that allows for integration of theory with practice. Certain evidence-based strategies promote development of clinical judgment.[21-23] Students can engage in some of these strategies to promote their own clinical judgment skills. The following paragraphs and sections include recommendations and examples for readers to consider in developing their own clinical judgment.

To better understand the factors that may influence the thinking of the nurse, consider the factors that appear on the side of the clinical judgment model in Fig. 40.1 and how they affect nursing care. As described earlier, formal theoretical knowledge provides a firm foundation for students to ground clinical judgment, so preparation for clinical experiences is essential. Using that knowledge in practice develops understanding of which knowledge is most important in a given situation. During clinical experiences, learn to recognize how formal, textbook knowledge guides practice; in the classroom, consider how practice experiences support understanding of what students have learned in the classroom. Think about how the caregiving situation, your own values, your own past nursing and personal experiences, and the patient and their specific values, preferences, and needs affect the particular caregiving situation. This may help you to recognize how the specific situation influences the nursing response to the individual patient.

Interaction with and learning from experienced nurses are helpful. Novice nurses and nursing students often admire experienced nurses who possess high-level clinical judgment skills. Taking advantage of a wide range of clinical learning opportunities and working closely with experienced nurses provides role modeling that can foster clinical judgment.[24] Analyzing situations in which appropriate nursing actions are not obvious or clear-cut can enhance development of clinical judgment.[25] Search for factors that affect the judgments that are made—including theoretical knowledge, nursing values, previous experiences, knowing the patient, and the patient care environment. Consider how these factors influence the situation. Then seek insight and support from nurses with more experience to validate your thinking.

Simulation is commonly used in nursing programs to extend clinical learning. Though students often describe simulation as stressful, learning through simulation scenarios can contribute to clinical judgment skills in a wide range of situations.[26] It is especially important to practice learning to care for patients in urgent and emergent situations, such as an acute asthma episode, shock, or those who are experiencing acute deterioration of their health status.[2]

Learning to Recognize Patterns

Pattern recognition of specific conditions is a significant aspect of noticing and interpreting patient care needs and leads to a deeper understanding of patient issues.[9] To recognize patterns, the nurse relies on identification of specific cues (derived from patient data) that fit together to lead to better understanding of the patient situation. For example, a patient with septic shock will likely display a pattern of elevated heart rate, poor perfusion, decreased oxygen saturation, and low blood pressure. Knowing this pattern alerts the student or nurse to note what signs or symptoms may be present or absent to determine an appropriate response. As students and nurses gain more practical experience, patterns related to nursing care become more apparent. As you work through case studies and participate in clinical care or in simulations, pay attention to patterns that you see and what they indicate. Asking nurses in the clinical setting to describe what they notice and what it means to them is another way to see a patient situation through their eyes and develop pattern recognition.

Applying Concepts to Nursing Practice

Students can broaden their pattern recognition skills by considering specific patient care concepts. Studying concepts breaks the larger patient situation into "chunks" that may be more easily understood. During clinical experiences, students can take advantage of opportunities to focus on specific patient care concepts, such as fluid and electrolyte balance, gas (oxygen–carbon dioxide) exchange, nutrition, pain, or human development. Look for assessment findings that relate to a given concept and search for patterns that appear in those findings. For example, for the concept of gas exchange, a pattern of rapid respiration, decreased oxygen saturation, intercostal retractions, and breath sounds with wheezes signal a pattern of respiratory compromise, possibly due to narrowing of the airways.

After studying findings related to the concept in your own patient, visit and discuss the patients of your classmates, then compare and contrast how a given concept presents in various patients to see more patterns.[22,27] For example, on a pediatric unit, you may care for a child with respiratory problems that require oxygen, perhaps a 4-year-old child with asthma with the symptoms described earlier. Consider why your patient is receiving supplemental oxygen and other factors (physical, developmental, and pathophysiological) that affect oxygenation and oxygen administration to your patient. Then visit another student's patient who is also receiving oxygen, perhaps a 12-year-old with pneumonia. Consider the same questions for your classmate's patient. Compare and contrast the two patients. What are the similarities? What are the differences? Why are they different? What learning will you apply to future situations?

Skillful Responding

An important aspect of responding involves setting priorities and modifying them as the situation changes. Pay attention

to how nurses in the clinical setting prioritize patient care. Consider the factors they use to make decisions about planning and replanning their patient care. Discuss prioritization of care as a part of your daily routine in clinical with nursing staff, other students, and nursing instructors. Identify the resources in the clinical setting that support skill-related decision making and performance, such as procedural references. Consider patient factors that require modification of a nursing procedure, such as placing an IV in a patient who has a neuromuscular condition. Think about what you expect the patient response to the intervention might be, and then observe the actual response.[22]

Reflective Practice

Reflection-on-practice—both verbal and written—is a learning activity included in many nursing programs with good reason. Reflecting helps nurses and students process and consolidate learning about caregiving situations.[3,18] Reflection on clinical experiences can support application of theoretical knowledge to clinical situations and improve prioritization of future nursing care.[19] As a student or a practicing nurse, there is a tendency to focus reflection on situations that went poorly,[8] and nursing students are often acutely aware of their knowledge deficits as well as their shortcomings in performing particular nursing skills. Although recognizing the need for improvement and analyzing how that will happen are critically significant parts of nursing practice, it is important to recognize and reinforce in your mind those things that went well and why.

Sharing clinical experiences is often a part of clinical postconferences, debriefing, and journaling and is integral to reflective learning.[9] In being an active part of this important learning opportunity and considering carefully the patients described by classmates, students multiply their exposure to different patient issues and gain deeper understanding of nursing practice.[27-29] Questioning each other and discussing different approaches to nursing care can help all students in the group broaden their thinking about nursing care options.[27-28] Fostering personal habits of reflection during nursing school, whether individually in writing, with a mentor or teacher, or in group discussions, provides a strong foundation for continued learning through reflection when one enters practice. Evidence shows that structured experiences in questioning, reflection, and debriefing using a guide and/or a rubric may further support development of clinical judgment.[3,19,22,28]

Measuring and Evaluating Clinical Judgment

Evidence suggests that development of clinical judgment can be described and measured.[6,17] Tools, such as the Lasater Clinical Judgment Rubric,[17] provide a clear description of levels of clinical judgment and can help students and their instructors identify students' progress in developing clinical judgment and goals for further growth.[28,30] Based on its close relationship to safe nursing practice, clinical judgment items have been incorporated in the NCLEX exam (Box 40.2). Learning to make skilled clinical judgments in practice will support performance on the licensing exam as will practicing the types of questions that test for clinical judgment. While passing the NCLEX exam is required to become a Registered Nurse, the main focus of student learning should be on developing and using clinical judgment in patient care—in clinical settings, simulation, and through case studies in class.

BOX 40.2 NCLEX Testing for Clinical Judgment

The National Council of State Boards of Nursing (NCSBN), the organization that is responsible for the registered nurse licensing examination (known as the National Council Licensure Examination or NCLEX-RN) in the United States recognized the need to assess clinical judgment as part of the NCLEX. A model has been created to evaluate it and includes the following elements for testing purposes: cue recognition, cue analysis, hypotheses prioritization, solution generation, taking action, and outcome evaluation.

Dickison, P., Haerling, K. A., & Lasater, K. (2019). The National Council of State Boards of Nursing Clinical Judgment Model. *Journal of Nursing Education, 58*(2), 72–78.

National Council of State Boards of Nursing (NCSBN) (n.d.). Next Generation NCLEX Project. https://www.ncsbn.org/next-generation-nclex.htm

INTERRELATED CONCEPTS

Several concepts in this textbook are related to the concept of clinical judgment. Featured in Fig. 40.2 are six concepts that are especially closely related to clinical judgment.

Evidence. Use of EBP is foundational to making clinical judgments. Nurses consider a variety of evidence from research studies, clinical guidelines, and standards of care. The nurse may also use evidence from past experiences and knowledge of "what works" for patient care within a particular unit culture, as well as practice experiences with a given patient ("knowing the patient") or understanding other contextual factors that affect a caregiving situation.[9,11]

Safety. Clinical judgment is integral to the safety of patients.[2] Consider the situation of an older adult getting up to walk postoperatively for the first time. From theoretical knowledge, the nurse knows that although falling is a danger when ambulating; however, there are significant dangers associated with immobility and staying in bed. From experience, the nurse may know that particular caution should be exercised because falls are very common in the hospital context and in this patient population, and there may be unit guidelines regarding fall prevention. In making the decision to get the patient up, the nurse considers factors including the patient's level of consciousness, strength, pain control status, motivation, and environmental context. The nurse's previous experiences with ambulating older adult patients will significantly inform these decisions.

Diversity, Equity, and Inclusion are increasingly recognized as affecting the quality of patient care, and consideration of these aspects of care is integral to clinical judgment.[9] Not all patients in the healthcare system are treated equitably and that racism is prevalent in health care. Disparities may be related to the system itself and/or to individual caregivers within the system.[14] Implicit (or unconscious) bias is characterized by prejudice, stereotyping, and discrimination, and may be unrecognized by the individual caregiver. Personal acknowledgment that these factors exist, reflection, and debriefing with others may support development of the self-understanding needed to

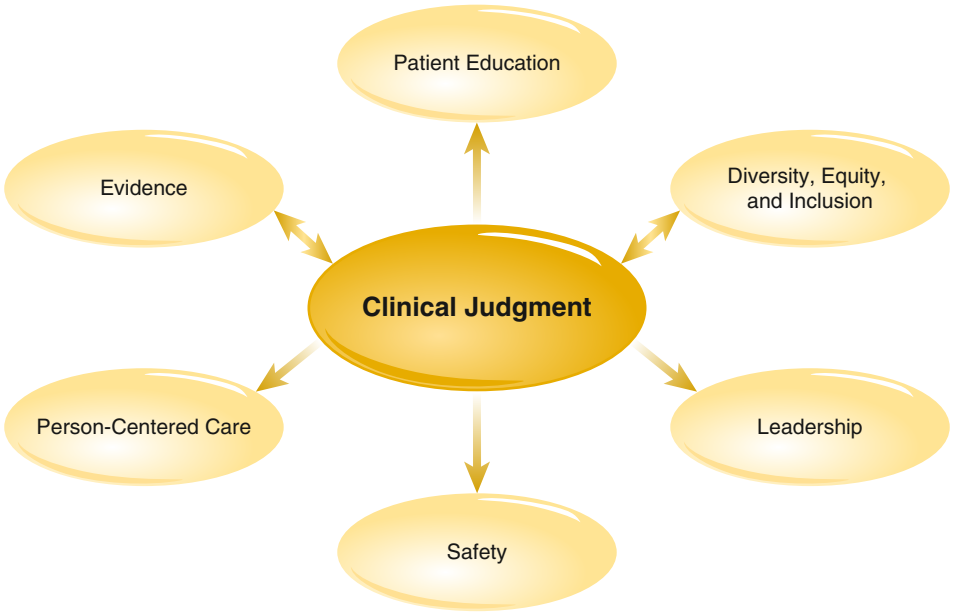

FIG. 40.2 Clinical Judgment and Interrelated Concepts.

better manage personal biases.[15] Cultural humility recognizes that this process is ever-changing and lifelong. It involves learning about the culture of others as well as examining one's own cultural identity and beliefs.[31] Awareness of and engaging in personal exploration of one's values and biases related to diversity, equity, and inclusion are key aspects of making sound clinical judgments. In Fig. 40.1, these factors appear as some of the background factors in the box on the left side of the clinical judgment model.

Leadership. All nurses engage in leadership activities. Leadership decisions made by nurses anywhere are often fraught with multiple competing factors and require judgment. More formal leaders, like charge nurses, must consider the mix of nursing staff in a shift, given the acuity of the patients, and make decisions about patient assignments. An individual nurse may delegate certain aspects of more stable patients' care to a certified nursing assistant, allowing greater focus by the nurse on those more seriously ill. These kinds of leadership choices are dependent on knowing the patient(s) as well as the backgrounds, skills, and abilities of the nursing staff.

Patient Education. Determining when, how much, and the approach to education with a patient and/or family requires clinical judgment. A patient newly diagnosed with diabetes needs to know about diet, medication, exercise, foot care, how to perform blood glucose monitoring, and medication administration. Because it is impossible for a patient to learn everything in one visit, the home health nurse must assess the patient's knowledge and prioritize which information is most important at a given time. Depending on the patient's response, the nurse may need to use clinical judgment to refine the teaching approach to best address the patient's needs. Clinical judgment is exercised throughout the entire learning process—noticing how much the patient remembers from the last visit and assessing learning outcomes.

Person-Centered Care. As discussed throughout this chapter, person-centered care is a value that nurses have when providing nursing care for best outcomes.[32] Person-centered care has been identified as a competency in nursing practice and includes the elements of holistic, individualized, just, respectful, compassionate, coordinated, evidence-based, and developmentally appropriate care.[5] Whether it's learning about the patient's patterns, such as responses to a certain medication or what activity brings on shortness of breath, or gathering the patient's preferences for nursing interventions, or knowing the patient's learning style before instituting patient education, it is critical that the patient be an active participant in their own care, both in acute care and community settings.[9]

CLINICAL EXEMPLARS

Clinical judgment is applied in all areas of nursing practice; thus, there are multiple examples. Box 40.3 presents five general areas in which nurses potentially apply clinical judgment within practice: application of clinical skills, recognizing and responding to urgent/emergent situations, communication, medication management, and management of care.

Featured Exemplars

Clinical Skills: Determining Type of Catheter

A nurse caring for a postoperative patient with anesthesia-associated urinary retention needs to decide whether to catheterize the patient, and if so, if a straight catheterization procedure or placing an indwelling (Foley, retention) catheter is best. Nurses consider the evidence, unit standard for catheter placement, and their knowledge of the patient, including mobility, cognitive status, and preferences. From clinical experience, they estimate how long a typical patient in this patient population might experience anesthesia-related urinary retention. Contextual knowledge may

BOX 40.3 EXEMPLARS OF SITUATIONS IN WHICH CLINICAL JUDGMENT IS USED

Clinical Skills
- Decisions about urinary or intravenous catheter placement, such as determination regarding size and type of urinary or intravenous catheter or whether placement is needed
- Decisions about timing and extent of bathing and personal care
- Assessment of a wound and determining next steps
- Selection of an appropriate dressing

Urgent/Emergent Situations
- Detection of subtle signs of sepsis
- Early identification and treatment of patient hemorrhage
- Starting oxygen to respond to decreased saturation levels and other assessment relevant findings
- Early recognition of anaphylaxis
- Recognition of and therapeutic response to mental health crisis

Communication
- Content and depth of patient teaching
- Communication with distraught or fearful patient or family
- Defusing potentially confrontational interactions

Medication Management
- Selection of dose when a range is ordered
- PRN (as needed) decisions
- Holding a medication
- Early recognition of adverse reaction or side effect from medication

Management of Care and Nursing Leadership
- Delegation to ancillary nursing personnel
- Prioritization of care among patients
- Initiating interprofessional communication (with physician, nurse practitioner, or other provider) when further guidance or medical orders are needed.
- Referral to another health professional (e.g., wound care specialist, dietitian)
- Advocacy for patient at care coordination conferences

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include the time of day; for example, placement of an indwelling catheter may allow the patient to rest through the night.

Management of Care: Patient Assignments

On a busy day on a surgical unit, the charge nurse must decide to whom a newly admitted patient should be assigned. The charge nurse uses their personal background knowledge of general patient care on the unit and unit policy regarding nurse/patient ratios, as well as acuity level of patients, and other environmental stressors in the unit on this particular day. The charge nurse also uses knowledge of the nursing staff. Does someone have particularly strong organizational skills or knowledge about the anticipated care needs of the patient to be admitted? The experienced nurse leader realizes that safe patient assignment goes well beyond abiding by the unit guidelines for patient/nurse ratios.

Urgent/Emergent Situation: Patient with Sepsis

The nurse caring for a patient being treated for leukemia notices a blood pressure (BP) of 70/40. To interpret this reading, the nurse uses background and theoretical knowledge (normal BP for the person's age and knowledge of this patient's usual BP trends over time). The nurse considers contextual factors, including therapies the patient is receiving that may lower BP. Prompted by theoretical knowledge of presenting signs of sepsis, his previous experiences with septic patients, and awareness of the patient's risk factors, additional data are collected to determine whether the patient's symptoms resemble sepsis. With these additional data, the nurse contacts the physician to discuss the next steps in the care.

Clinical Skills: Wound Care

A nurse working at a free clinic sees a patient just released from jail and living in a single-room occupancy hotel. He has an open wound on the left hip and lives alone and has no family or close friends nearby who can assist with wound care. The nurse must use background knowledge to select an appropriate dressing from a wide range of available materials and knowledge of the patient to help the patient change the dressing. Safe patient care includes ensuring that patients can manage their own care, sometimes in challenging circumstances that require highly skilled clinical judgment.

CASE STUDY

Case Presentation

Leon Rowen is a growing premature infant whose 32-year-old mother, Cassandra Rowen, is described by the nurses in the unit as "difficult." The baby is nearing discharge, but Cassandra is reported to be "resistant" to learning about how to feed and care for her infant. Cassandra has other children at home, but none of them was premature. A nursing care priority for the day is parental teaching about safe feeding of her premature baby.

Ruth, the nurse assigned to care for Leon, has worked in this unit for 10 years. Ruth observes the entire caregiving situation and sees that Leon's condition is stable. Ruth meets Cassandra and notices she is quiet and sullen. Rather than beginning by explaining how to feed the baby, Ruth asks about Cassandra's other children and shares a little bit about the challenges of parenting her own children who are of similar ages as Cassandra's other children. Cassandra smiles and agrees. As time passes, Cassandra begins to talk about what a frightening experience having a premature baby has been. Ruth acknowledges those

CASE STUDY—cont'd

feelings. Cassandra smiles and begins to ask questions about how to care for Leon. Ruth answers those questions in a way that is tailored to what the mother has revealed about her family. Cassandra demonstrates feeding Leon in a developmentally appropriate way based on Ruth's teaching. At the end of the shift, Ruth believes Cassandra has made significant progress toward competence in meeting her baby's unique needs. On the trip home, Ruth considers the experience. She realizes that prioritizing getting to know the mother and building a relationship by sharing a bit about herself as a parent helped to create emotional safety and trust so that Cassandra could talk about her apprehension as a first-time mother of a premature baby and then focus on learning infant care.

Case Analysis Questions

1. How does Ruth apply her knowledge and previous experience as a starting point for clinical judgment in this case?
2. In what way is there evidence that Ruth reflects on her experience to gain deeper understanding and further develop expertise?

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CONCEPT 41

Person-Centered Care

Jean Foret Giddens

Providing care to improve the health of people is at the very heart of nursing practice. Every nurse in professional practice has a direct or indirect role in the care of patients. A person-centered approach to health care acknowledges and supports the role of the patient and family members in setting goals and making decisions related to one's health and health care. Optimal healthcare outcomes occur when nurses and other members of the healthcare team fully commit to these principles. This concept presentation examines the elements and associated competencies needed by nurses to incorporate a person-centered approach within professional nursing practice.

DEFINITION

Person-Centered Care is a concept shared and applied by all healthcare disciplines. Because of its wide application, there are many definitions and variations in the term. Clarification of two similar terms—*person-centered care* and *patient-centered care*—is a helpful starting point for this concept presentation. Although, at first glance, the two terms may seem to be the same, there are distinct differences in meaning. Not surprisingly, there are differing opinions regarding which is the best term.

Advocates for the term *patient-centered care* assert that, in the context of health care, specific words (such as patient, nurse, physician, pharmacist) are used to establish and clarify the role each person has in the healthcare experience. These are well understood by the general public. Furthermore, the primary focus is on the patient regarding their health care, hence the term *patient-centered*.

Advocates for the term *person-centered care* emphasize the need to know the person from a holistic approach, focusing on their strengths and including individuals and their family members as partners in care. It has also been suggested that the term *person* has broader (nondisease) focus, whereas the term *patient* connotes someone who has an illness or injury. Furthermore, it represents a hierarchal relationship between the patient and members of the healthcare team, which could be perceived as disrespectful. As a side note, other alternatives to the term *patient*, such as *client, consumer,* or *partner*, to connotate a deeper respect of the individual receiving health care, have been proposed over the years. The World Health Organization adopted the Framework on Integrated People-Centered Health Services as a desired broad umbrella with the intent of putting people and communities, not diseases, at the center of health systems.[1]

Despite the differences in meaning and preference for the terms, both *patient-centered care* and *person-centered care* are widely used in the literature, often interchangeably. Setting the debate about the "best" term aside, what is most important is the way nurses and other healthcare providers interact with those they serve and that they fully commit to a "centered" approach. For the purposes of this book, *person-centered care* (PCC) is the term used to formally refer to the concept, although both terms are used throughout the chapter, again reflecting the variability of terms in the literature.

Considering the inconsistent terminology, it should be no surprise that many definitions are found in the health sciences literature, and, thus, there is no single agreed-upon definition. The context of PCC ("person" or "patient") refers to an individual, their family, and others who are important to that that individual. A very simple definition of PCC is "*Healthcare delivery that foremost considers the patient.*"[2] In contrast, an expert panel convened by the American Geriatrics Society was formed to define PCC. The panel offered a much more comprehensive definition:

> Person-centered care means that individuals' values and preferences are elicited and, once expressed, guide all aspects of their health care, supporting their realistic health and life goals. Person-centered care is achieved through a dynamic relationship among individuals, others who are important to them, and all relevant providers. This collaboration informs decision-making to the extent that the individual desires.[3]

For the purposes of this concept presentation a simple, popular, and contemporary definition of person-centered care from the World Health Organization is used: *Empowering people to take charge of their own health rather than being passive recipients of services.*[1]

SCOPE

Historically, the focus of healthcare delivery was based on the perspectives and opinions of those working in health care. However, PCC represents a shift in this focus from the healthcare provider to the individual, family, and community. Healthcare professionals often assume they know and understand the patient's illness experience. Although many nurses and other healthcare professionals have extensive experience assessing, diagnosing, and caring for patients, this expertise does not translate to the actual experience of living with a health condition. The truth is that nurses and other healthcare professionals cannot directly speak to the experiences of illness symptoms or the experiences of managing a condition; they can only speak to what they observe and what they hear from other patients who have health conditions. Healthcare experiences are highly individualized and influenced by multiple factors; thus, this information must come directly from the individual seeking health care. The leading principle of person-centered care is that the patient takes center stage. This requires healthcare professionals to shift from taking action to improve health *for* people to taking action *with* people.[4] Optimal healthcare experiences occur when there are positive, personal relationships between patients, families, and healthcare professionals, as well as within an organizational culture that supports such a model of care.

The concept of Person-Centered Care is broad and encompasses many dimensions; thus, describing a single clear conceptual scope presents a challenge. That said, in the simplest of terms, the scope of person-centered care includes three components: the patient and family (patient-as-person), the healthcare professionals (professional-as-person), and an organizational culture committed to person-centered care[5] (Fig. 41.1).

Patient-as-Person

Patient-as-person refers to patient-centeredness. The patient and their family members feel respected as unique individuals and are encouraged to be engaged in healthcare decisions. Healthcare professionals express genuine interest in them as people, not just their diagnosis. In other words, people—not their health conditions—are placed in the center, thus allowing individuals to take charge of their health and healthcare. Nurses and other healthcare professionals must commit the time and effort to actually get to know patients, their unique circumstances, their interests, their goals, learning what matters most to them, and engage them in care.[6] This includes goal setting, prioritizing, determining what is of greatest concern to the patient, respecting diversity, and understanding how diverse cultural, ethnic, and social backgrounds affect decision making.

Professional-as-Person

Professional-as-person refers to the way patients and their families view nurses and other healthcare professionals who are involved in their care. Healthcare professionals should project a caring demeanor and genuine interest in the patient. When a healthcare professional assumes a paternalistic role, a power differential exists and, thus, may limit patient engagement. Effective person-centered care is characterized by shared power, shared decision making, a therapeutic alliance between the nurse (or other healthcare professionals) and the patient/family for a respectful and engaging patient-provider dyad. Therapeutic relationships must be established, and the boundaries of those relationships must be clear and maintained.

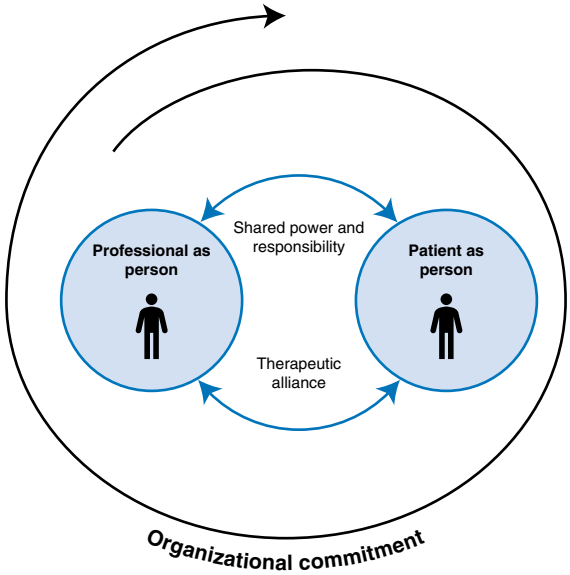

Fig. 41.1 Scope of Concept: Person-Centered Care.

Organizational Commitment

The full benefit of a person-centered approach occurs with the integration of PCC throughout an organization by remove barriers and ensuring resources to facilitate the achievement of person-centered goals. An organizational commitment to a person-centered approach requires all individuals (not just nurses and healthcare professionals) to adopt the patient-as-person philosophy. It requires an assessment of policies that may detract individual decision making or inclusion of family members, including barriers to the presence of families or designated surrogates. Organizational commitment requires intentional employee development and embedding organizational goals and dashboards to monitor progress toward a patient-centered environment. Employees should be encouraged to reflect on their own practice in relationship to the key principles of PCC. There must be consistency between what organizational leaders and policy makers believe is happening and the actual experience of patients and their families.

ATTRIBUTES AND CRITERIA

The primary emphasis of PCC is putting people and their individualized preferences and needs at the center of healthcare delivery. One of the two foundational standards that must be present to support PCC is that a therapeutic relationship is established between people seeking care and the healthcare professionals. A high-quality, person-centered approach simply cannot be achieved if trust is not established with the patient and family through positive therapeutic relationships. The second standard is that people seeking healthcare services should

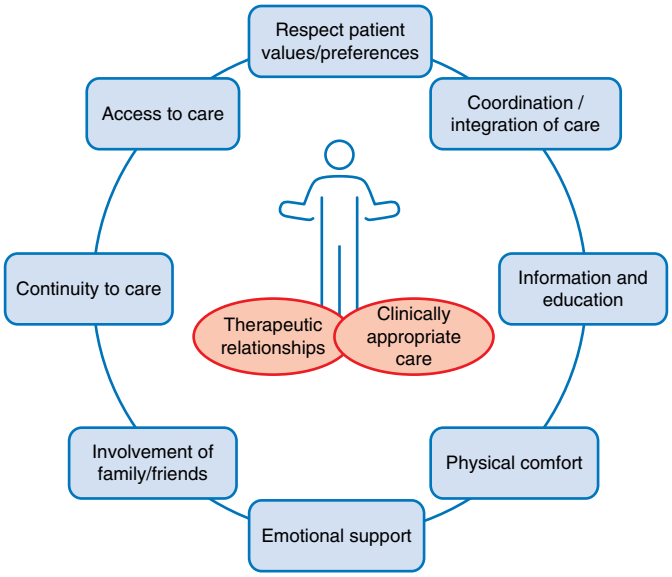

Fig. 41.2 Attributes of Person-Centered Care.

receive clinically appropriate care. In other words, healthcare professionals must be competent and provide effective treatment options. Building on these two foundational standards, a framework of eight principles serves as attributes for PCC (Fig. 41.2). These principles, which are widely used to describe PCC, are based on those proposed by the former Picker Institute.[7,8]

Respect for Patient Values, Preferences, Needs

Patient preferences, values, and needs are at the center of PCC. Cultural beliefs and values held by individuals and their families have a powerful influence on how people perceive and interpret information and actions associated with the healthcare experience.

Empowering people to take charge of their own health requires that their perspectives and input are linked to improved health outcomes. Thus, the beliefs, preferences, and needs held by patients and families must be acknowledged and supported.

Coordination and Integration of Care

The healthcare system is complex, and far too many people experience disjointed services associated with their care. Individuals should expect that accurate information follows within each step in care, and that the individual is connected to the right type of care within an appropriate time frame. The coordination and integration of care and related services reduces uncertainty and frustration experienced by individuals and their families.

Information and Education

Individuals should receive reliable and accessible information at all junctures of the healthcare experience in a timely manner. Furthermore, the information should be clear and understandable and should support the individual to make informed decisions about their health care and to optimize self-care.

Physical Comfort

Optimal healthcare experiences require that the healthcare environment is perceived as safe and comfortable, offering privacy and dignity to those seeking care. Additionally, healthcare professionals should be attentive to the physical needs of individuals seeking care, such pain management and assistance with daily living needs.

Emotional Support

Optimal PCC incorporates a holistic, caring approach. Healthcare professionals should show empathy and respect the emotional needs of individuals during the healthcare experience. Resources are provided to minimize fear, stress, and anxiety regarding physical status, treatment, prognosis, and financial aspects of care.

Involvement of Family and Friends

A person-centered approach acknowledges the importance of family, friends, and other supportive individuals as part of the healthcare experiences. In accordance with the wishes of the patient, family members should be made to feel welcomed in the care setting and encouraged to be involved in the decision-making process. Furthermore, PCC includes supporting family members as caregivers, and recognizing their needs in addition to the individual receiving care.

Continuity of Care

Individuals interface with a wide range of health professionals and support staff as part of the healthcare experience. Continuity of care refers to an expectation that the care is coordinated across the continuum of providers and services, with continuity and smooth transitions supported by communication, information, and management from one situation to the next.

Access to Care

Access to the right care in a reasonable time frame is an expectation for all individuals. Access includes the ability of an individual to be seen for both routine and unplanned healthcare visits; this, of course, requires availability of the type of healthcare professionals needed. Specific elements associated with access to care include the ease of making an appointment, the waiting time between when an appointment is made and the actual appointment date, waiting time for referrals or specific treatment, and ease of going to the location where the care is offered. In summary, the right care should be available at the right time and the right place.

THEORETICAL LINKS

An underlying theoretical perspective associated with PCC is the value-based care (VBC) model, where hospitals and healthcare providers are compensated based on patient health outcomes. The core idea around VBC is associated with improving quality of care delivered for patients, with "value" being the measured improvement in a person's health outcomes and experiences in consideration of the cost of achieving that improvement[9] (Fig. 41.3). Thus, an important metric of VBC is the quality of care modified by cost. Value-based health care represents a shift in the way provider practices and health systems are designed, managed, and reimbursed, with an emphasis on the quality of care provided as opposed to the quantity of care provided. Specifically, VBC models are designed to reward healthcare providers with

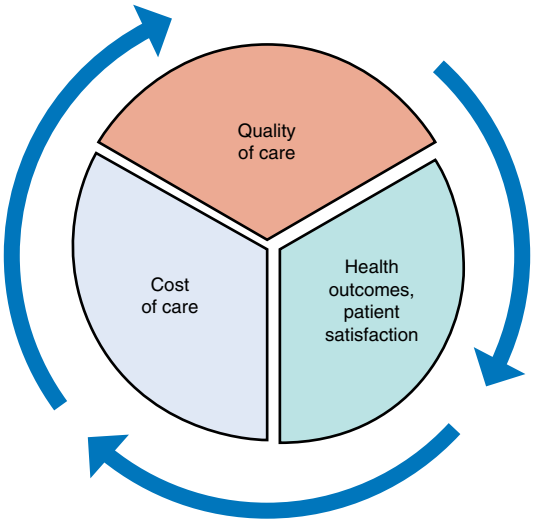

Fig. 41.3 Elements of Value-Based Care Model.

incentive payments for the quality of care given to people with a three-part aim: *better care* for *individuals and populations* at a *lower cost.*[10] Like PCC, success in a VBC model requires an organizational commitment and is embedded into the work ethic of everyone working within the organization. The VBC model represents a shared commitment to understanding the health needs of patients and then designing and organizing health care around segments of people with shared health needs (in contrast to health care being organized around service providers).[9]

VBC is typically measured by healthcare outcomes and one of several metrics, including patient-centeredness. Although these are complementary principles, alignment between VBC and PCC requires that patient-centered measures are intentionally incorporated into VBC metrics.[11] A systematic review of healthcare literature on VBC initiatives revealed that a considerable proportion of studies reported on financial outcomes focused on cost savings as a metric for VBC, and that significantly fewer reported on outcome measures that matter to patients.[12] Focusing on outcomes that matter most to patients (such as physical comfort, addressing health issues to prevent disease progression, and helping people have normal lives while getting care) brings the value of health care into alignment with the patients' healthcare experience.

CORE COMPETENCIES

Person-Centered Care

- Establish a positive, trusting, therapeutic relationship with individuals and family members.
- Effectively communicate with recipients of health care.
- Develop an individualized plan of care in partnership with the individual and family.
- Implement interventions and evaluate patient outcomes, modifying the plan of care as needed, in collaboration with the individual and family.
- Provide instruction and education to individuals and family; encourage and support self-care.
- Facilitate continuity of care through care coordination measures, incorporating as assessment of needs and assets.

BOX 41.1 Excerpts From the World Health Report, 2000 as It Relates to Person-Centered Care

- "At the centre of service delivery is the patient, in the case of clinical interventions, or the affected population, in the case of non-personal public health services."
- "The consumer may be the patient or someone such as a mother acting on his or her behalf, or simply a person making choices about diet, lifestyle, and other factors that affect health."
- "Often the choices people make, particularly bout seeking care, are influenced by the responsiveness of the system…"
- "Calling the elements of dignity, autonomy, and confidentiality that go into responsiveness 'respect for persons' underscores the importance of people, and not simply patients, as the recipient of health services."

From the *World Health Report 2000: Health Systems: Improving Performance*. Geneva, World Health Organization, 2000, pp. 50–51.

CONTEXT TO NURSING AND HEALTH CARE

The PCC movement began at the beginning of this century, at a time when healthcare clinicians, healthcare organizations, and governmental agencies became increasingly interested in improving health care. The World Health Report 2000,[13] represented conversations taking place at that time for changes needed in the healthcare industry to improve the performance of health systems around the world (Box 41.1). At about the same time, *Crossing the Quality Chasm: A New Health System for the 21st Century* was published. In that report, PCC was one of six domains associated with healthcare quality and defined as "providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions."[14]

Today, PCC is applied throughout all aspects of care delivery and involving all people who have a role in healthcare delivery. In fact, every point of the healthcare experience is an opportunity to practice PCC from those providing parking valet services, to staff assisting individuals with registration, to healthcare professionals who are seeing patients, to those making follow-up appointments, as a few examples. Individuals in each of these roles can incorporate one or more of the PCC attributes while performing their specific job functions. The full benefit of PCC occurs when there is organization-wide commitment to do so.

Role of the Nurse and Delivery of Nursing Care

Nurses have a particularly unique opportunity to apply PCC as a centerpiece of their practice, regardless of their practice area or specialty. This holistic approach focuses on a respectful relationship with the patient that is grounded in trust. In the process of care delivery, nurses attend to the individual preferences and needs of patients, support partnership in decisions about care being made, address emotional and/or physical needs, and ensure there is smooth coordination of care.

Relational Lens

Nurses gain trust from the patient and family members through respectful communication; acknowledging the patient's individual

beliefs, values, preferences, and needs; and demonstrating empathy and compassionate care through their interactions. Nurses should intentionally get to know the patient, not just the patient in the context of a diagnosis, but the totality of who they are and their unique lived experiences. Taking interest in the patient serves as the foundation for developing mutual trust and respect with the individual and family and the promotion of caring relationships. Nurses engage the patient and family member as a full participate of decisions associated with their care.

Care Delivery

PCC is incorporated into all aspects of nursing care, from the point of care through systems level care. Nurses conduct a health assessment, which includes completing an accurate history, performing point of care screenings and physical examination, and accurately communicating the findings of the health assessment. Nurses use assessment data in the context of the patient's preferences to prioritize health concerns and develop a plan of care, in partnership with the patient. The engagement of the patient and family in the plan of care is essential. The goals and the plan for care must be valued by the patient and reflective of what they agree to do, not just a list of what is recommended by the nurse. The actual delivery of care through interventions aligns with mutually agreed upon plans that follow established protocols and evidence. Because many other healthcare team members are involved in the delivery of care, the nurse ultimately monitors the implementation and ensures accountability to the patient.

Information and Education

An important component of PCC is providing information to patients and their families that is clear, consistent, and respectful of the patient's perspectives and wishes. This is critical as part of the decision-making process and plays in important role in promoting self-care management. Nurses use individualized educational strategies to help patients and their families learn about and engage in health promotion and illness prevention strategies, as well as in ways to optimize self-care in the management of chronic conditions and in the recovery of acute illnesses or injury.

Care Coordination

The seamless coordination of patient care services is one of the hallmarks of PCC. Nurses have an important role in the coordination of care, starting with an assessment of assets and needs of the patient and family in the context of preferences. Nurses are uniquely positioned to provide care coordination through interprofessional team-based collaboration, communicating with other members of the healthcare team across health systems, and clarifying responsibilities among members of the health team and with the patient and family. Ultimately, patients and their family members are entitled to a clear understanding of what the next steps are, meaning what future care is needed (and mutually agreed to) and when and how it should occur.

Structural Integration of Health Services

Structural integration refers to how health services are organized and delivered within a health system. This often means consolidating medical practices and services into larger groups to enhance communication and coordination of care—a "one-stop shop" concept. Consider this scenario:

> Jasmine developed concerning symptoms and wanted to be seen by a healthcare provider. After playing "telephone tag" for 2 days she is finally able to make an appointment, but it is 3 weeks out. During this time, Jasmine becomes increasingly worried about what might be causing the symptoms.
>
> On the day of her appointment, Jasmine drives to the healthcare facility, spends 10 minutes finding a place to park, and then walks the equivalent of two blocks to the front entry. After getting registered, she waits in a crowded waiting area for 40 minutes—well past the original appointment time. She eventually has a brief conversation and examination with a physician, who recommends diagnostic testing and taking a prescription medication to ease the symptoms. When she checks out, Jasmine is handed a prescription and is given written instructions for the tests that have been scheduled the following week at a diagnostic testing center on the other side of town from her home. The following week she has a similar experience at the diagnostic testing center.
>
> A few days later Jasmine is contacted by a nurse from the physician's office, given information about her test results that she does not understand, and advised to follow up with a specialist. The next available appointment with the specialist is in 6 weeks. Jasmine is frustrated that she still does not know what is causing the symptoms and doesn't think anyone cares.

This scenario describes a lack of alignment for care and services (and a failure to establish a trusting relationship). To address these issues, many healthcare organizations have adopted integrated care models of care that prioritize primary and community care services, focusing on health promotion, wellness, preventative care, and self-management.[1] Healthcare system redesign is needed to fully actualize PCC. Curative and restorative care is still necessary and will continue to exist, but there is a greater commitment to meeting the healthcare needs of patients within the community.

The shift toward more outpatient and ambulatory care has required reducing some forms of care that are efficient for the health system (inpatient services and specialized outpatient care) in favor of what is most convenient best meets patient needs.

Specifically, health services should be coordinated around the needs of people, not around the needs or convenience of healthcare providers. Healthcare redesign must consider the coordination of services within and across multiple sectors, with a robust process for information management, referral, and care across networks. This may require merging or changing structures, services, and workflows to achieve system effectiveness. Also, care should reflect evidence-based practices and improvement strategies that address processes that perpetuate structural racism. The net goal is improved care delivery and continuity of care through the alignment of health services and technologies that support healthcare data integration.[15]

Benefits

There are a number of benefits to a PCC approach that are realized by patients, families, employees, and organizations. For patients and their families, the benefits include better health outcomes. Person-centered care facilitates patient and family engagement in the treatment plan and greater use of their own resources for self-management of health conditions and/or assumption of wellness behaviors.[16]

Healthcare organizations that practice PPC tend to have higher satisfaction scores among patients and families because patients report feeling more comfortable and confident in the care received. PCC elevates an organization's reputation of providers among the pubic, improves resource allocation, and increases financial margins.[17,18] A concern initially raised about PCC was that it would be cost-prohibitive. However, a study comparing standard care and PCC found that PCC was not associated with a higher cost.[19] Among employees, PCC has been shown to be associated with greater moral, greater job satisfaction, greater productivity,[20,21] less stress of conscience, and less intent to leave.[22]

Challenges

Doing PCC well is hard. It requires organization-wide commitment and commitment at the individual level. It requires highly efficient communication among multidisciplinary team members. Some voice concerns about the additional time needed to deliver care in a PCC model because of the time it takes to really get to know the person and family members, to hear their stories. Others acknowledge that the investment in time needed to get to know the patient on the "front end" may result in greater efficiencies and better care on the "back end," but this was also associated with greater levels of job strain.[22]

Another challenge is finding balance. Engle and colleagues confirmed that a balance is needed when delivering evidence-based practice and PCC.[23] Indeed, tensions can arise when there is a perceived disconnect between patient rights, ethics, and personal preferences.[6] Person-centered care is not about giving a patient anything and everything they want. The primary goal is to ensure that patient preferences are incorporated into the clinical decision-making process. Having patients and family members involved in decision-making is based on providing guidance regarding reasonable treatment options. In other words, care provided by healthcare professionals still falls within best practices and treatment guidelines.

As an example, for patients experiencing chronic pain, several evidence-based pain treatment options are discussed with patient/family. These may include pharmacologic agents and a variety of complementary and alternative therapies such as massage therapy, acupuncture, acupressure, guided imagery, biofeedback, nutritional supplements, and aromatherapy. In this way the patient has input into the options that best align with his or her preference and taking into consideration personal variables and context.

INTERRELATED CONCEPTS

The concept of PCC has a connection to nearly all concepts in some way. For example, all the Health and Illness Concepts are interrelated with PCC. The very process of delivering care (assessment, diagnosis, developing a plan of care, carrying out interventions, and evaluating patient outcomes) incorporate the principles of PCC. There are some concepts that are more closely aligned than others, and the ways they distinctly differ from PCC are discussed here and shown in Fig. 41.4.

One of the key attributes of PCC introduced earlier in this chapter is the intentional inclusion of family and significant others (**Family Dynamics**) into the healthcare experience. This includes providing accommodations for family, acknowledging the needs of family members, and involving them as part of the decision-making process regarding a patient's care. The inclusion of family adds great value to the decision-making process and the outcomes of care, particularly when family members are engaged in caregiving activities. However, dysfunctional family interactions can create challenges; thus, it is important that the inclusion of others is based on the patient's wishes.

Another concept that closely aligns with PCC is **Culture**. Care that truly incorporates patient preferences, unique needs, interests, and wishes of the patient and family requires that the nurse have an awareness of and appreciation for differences in

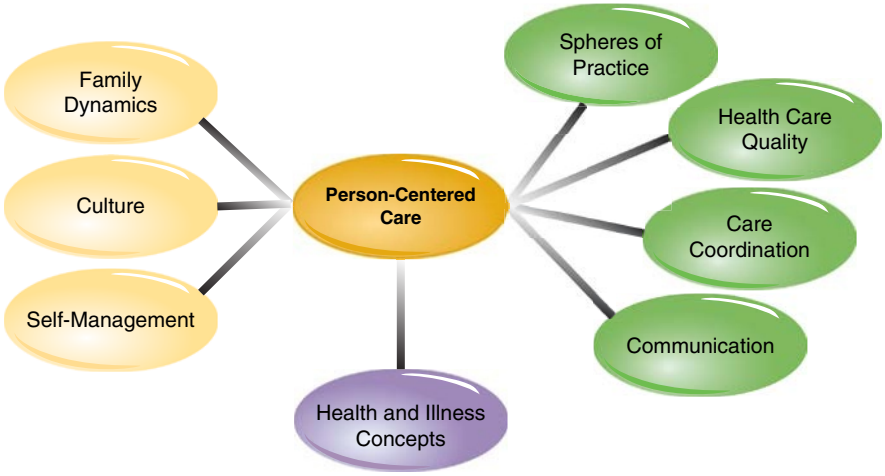

Fig. 41.4 Person-Centered Care and Interrelated Concepts.

values that exist in individuals from different backgrounds and for the diversity of their experiences. Nurses addressing these preferences treat patients with respect and are sensitive to their cultural values.

Care Coordination, another closely aligned concept, represents one of the identified attributes of PCC. This involves smooth and efficient coordination of care throughout a healthcare experience, which includes sites of care, ancillary and support services, transitions of care between providers, and transitions to home. Three other closely related concepts that align with PCC are **Communication**, **Patient Education**, and **Self-Management**. Patients and their families should be updated as information becomes available related to their clinical status and process of care. They should be given relevant information so they can self-manage their conditions and make informed decisions about their care.

The concept **Health Care Quality** also closely aligns with PCC. The connections between quality, safety, and patient-centered care were introduced by the Institute of Medicine over two decades ago in the document Crossing the Quality Chasm.[14] More recently, PCC has also been described as a critical component in providing high-quality care by the Centers for Medicare and Medicaid Services, thus providing continued affirmation of this connection.[24] Finally, the concept **Spheres of Practice** is relevant because PCC is applicable and should be practiced in all areas of health care.

CLINICAL EXEMPLARS

There are several examples consistent with PCC in all areas of health care. Considered alone, these exemplars may not seem to be impactful, but, when practiced consistently, they collectively support PCC. Box 41.2 identifies some of the most common situations, and a few featured exemplars are described further.

Featured Exemplars

Family Engagement

The involvement of family is expected in PCC, with the consent of the individual seeking care. Parents and other family members have historically been included in care decisions in pediatric settings because of legal guardianship. For adult patients, the value and benefit of family member involvement cannot be overstated. Family members may offer additional information, observations, insight, and support; they may be helpful in thinking through ways to make treatment plans successful. Engagement of the family is particularly important when a family member is in a caregiving role.

Medical Home

Medical home care follows a trend that allows individuals to be treated for conditions often requiring inpatient care (including complex medical conditions) in their home. This exemplifies PCC because it addresses the wishes of the patient, requires involvement of family members who will be involved in care, and requires careful and well-planned coordination of care among an interdisciplinary team. Medical home models are associated with effective management of chronic conditions, improved quality of care, increased patient and provider satisfaction, and have demonstrated cost effectiveness.[25] An assessment of the individual and family assets and resources is required to determine the best way to mutually achieve the health goals.

Visiting Policies

Hospitals and other healthcare agencies typically have established policies about patient visitation. Such policies are in place for safety measures and to minimize disruptions in the provision of care. However, there may be times when such policies interfere with the unique needs or preferences of an individual and/or their family members. If it is feasible, an exception to a policy may be reasonable to accommodate their unique circumstance. The COVID-19 pandemic placed significant limitations on in-person visitation, and many nurses helped to facilitate web-based visitations.

BOX 41.2 EXEMPLARS OF PERSON-CENTERED CARE

Patient Preferences
- Learning about personal values, previous experiences, preferences
- Cultural assessment
- Meal selection
- Choice of mealtime
- Clothing selection for day (don't have to wear a gown?)
- Altering bedtime and wake time to accommodate patient
- Family member presence
- Visiting policies

Engagement in Decision Making
- Personalized medicine
- Customized plans of care
- Patient involvement in treatment options and treatment plans
- Family involvement in treatment options and treatment plans
- Self-management
- Health promotion and wellness

Information and Communication
- Therapeutic communication
- Interprofessional communication
- Handoff reporting
- Electronic medical record
- Timely updates regarding care
- Patient education

Personal and Emotional Needs
- Physical comfort and needs
- Emotional needs
- Accommodations for family members and visitors (food, blankets, chairs)

Coordination of Care
- Transitional care
- Patient instructions
- Discharge planning
- Medical home and home care
- Self-management

Cultural Assessment

A cultural assessment is an expected component of professional nursing care. It represents opportunity for nurses to gain an understanding from the patient and family regarding personal beliefs about health and illness, health practices, priorities, expectations for treatment, and expectations/perceptions about the process.[26] The assessment uncovers information needed by the nurse and other members of the healthcare team to provide care in alignment with the patient and family preferences. Nurses intentionally maintain an awareness of unconscious biases that can contribute to disparities in treatment.

Transitional Care

Transitional care refers to the safe movement of a patient between levels of care and care settings.[27] Effective and successful transitional care for individuals with multiple complex health conditions requires exceptional care coordination, access to information, and communication; these elements are central to PCC. Transitional care is especially important for older adults moving from an inpatient setting to a home setting to be cared for by family caregivers. In these situations, family engagement in decision making regarding postdischarge care is directly linked to a positive experience for the patient and family and to healthcare outcomes.

CASE STUDY

Case Presentation

Aaron Evans is a 6-year-old boy who was diagnosed 2 years ago with nonresectable osteosarcoma that was localized in his left hip. Aaron underwent chemotherapy and radiation which resulted in his cancer going into remission. However, it was recently determined that Aaron has extensive metastatic disease in in his lungs. The pediatric oncologist shared with his parents, Brian and Jill, that Aaron's long-term prognosis is very poor, with an estimated 5-year survival rate of less than 10%. Despite this, the pediatric oncologist encouraged Brian and Jill to remain optimistic. The benefit of additional chemotherapy and radiation therapy was presented as the best option for Aaron, to reduce the size of the tumors. Other measures that were discussed were associated with palliative care. The pediatric oncology nurse spent additional time with Brian and Jill explaining the various treatment options, provided information in writing, and asked them to think about the options prior to a care planning meeting scheduled for the following day. Brian asked if his parents could be included in the meeting to help them think through the various decisions. The nurse let Brian know they would be more than welcome.

An interprofessional team meeting was held the next day to determine the best treatment plan. The meeting included Brian and Jill, Brian's parents, the pediatric oncologist, a pediatric oncology nurse, and care coordinator The team discussed several goals including the best outcomes for Aaron, how to best support Brian and Jill, and learn what was most important to them. The team learned that Brian and Jill were fully aware that Aaron had a poor prognosis, and that their primary wish was for him a normal life for as long as possible. They shared their experiences and observations when Aaron underwent radiation and chemotherapy treatments previously and summarized by stating they were not in support of aggressive treatment options. Jill told the team members they just could not fathom putting their son through that again and instead hoped they could do more to keep him comfortable. She broke down crying and Brian and his parents were unable to console her. The nurse offered water, tissues, and suggested a short break to give the family some space.

After the break, the care coordinator readily agreed to connect Jill and Brian to Palliative Care services. Not only did she schedule an appointment with the Palliative Care team, but she also texted Jerome, the nurse manager of Palliative Care services asking him to drop by the meeting that was in progress for a quick introduction if he was available. When Jerome received the text, he reflected on the importance of helping the family feel at ease with this difficult decision. He made this a priority and changed his plans so he could drop by for an introduction. Meeting Jerome put Brian, Jill, and Brian's parents at ease because they now had a connection prior to changing services. It was also important to them that the manager of Palliative Care Services knew their story and had a genuine interest in their son. Jill was grateful that nobody criticized their decision, and nobody made her feel like a bad mother for wanting to stop chemotherapy.

The team also learned that Aaron has two older siblings. It was important to Brian and Jill that their older children have as much quality time and interaction with Aaron as possible, and they also did not want their lives to be put on hold or disrupted by Aaron's illness. During the meeting Jill also acknowledged significant anxiety and depression and was worried she could not sufficiently provide emotional support for the family. Brian was concerned about the long-term financial impact on their family and wondered how they would ever pay the Aaron's medical bills. The team recognized the need to arrange resources to help the entire family during this very difficult time.

Case Analysis Questions

1. Consider the attributes of person-centered care. What attributes were evident in this case?
2. How do the interrelated concepts apply in this case?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 42

Ethics

Debra Bennett-Woods

Am I ever justified in withholding the truth from a patient? Should I respect the wishes of the family or the wishes of the patient? Is there a point at which the treatment I am providing causes more harm than good? What do I do when I suspect my best friend is caring for patients while under the influence of alcohol? When short-staffed, how do I divide my time among too many patients? Is there a limit to how many scarce resources I should provide to any one patient?

These are difficult questions, and not everyone will agree on the answers. On one level, these are practical problems and decisions that need to be made to do a job. However, on a deeper level, they are moral and ethical choices that go beyond our formal training and job description. They cannot be answered with simple logic or by referring to a policy or procedure manual. Rather, how you respond to such questions is a reflection of the core values, beliefs, and character that make you the person that you are and, ultimately, the professional that you become. The actions you take in response to ethically challenging situations often require great courage, compassion, or commitment. At the same time, failure to act or respond ethically can lead to serious and even dangerous errors, personal stress, and professional burnout.

Very few of us start our day wondering, "How can I harm someone today?" or "What unethical action should I take first?"[1] In fact, most of us would like to end the day feeling as though we made a positive difference in the world and satisfied that we did our best. We want the respect of our colleagues and patients. Most important, we want to feel at home in our own skin. We want a sense of personal and professional integrity—the feeling of wholeness we experience when our actions are consistent with our core beliefs and values. Technical proficiency in nursing is important but not enough, in and of itself, to guarantee this sense of integrity. To achieve the ideal of professional integrity, one also needs the skills and abilities of ethical practice, including ethical awareness, reflection, analysis, and decision making along with moral courage.

DEFINITION

Morality is a broad term that is used most often to refer to an accepted set of social standards or morals that guide behavior. *Ethics* and its various approaches deal more specifically with concepts of right and wrong. Although the terms *ethics* and *morality*, and the descriptors *ethical* and *moral*, are often used interchangeably, it is helpful to think of the various approaches to ethics as a foundation for morality and moral behavior. Thus, a simple working definition of ethics is the study or examination of morality through a variety of different approaches.[2] To understand morality, an understanding of underlying concepts, assumptions, and methods of the various approaches to ethics is needed.

Ethics is also a process involving critical thought and action. *Ethical sensitivity,* or *ethical awareness,* helps us recognize when there is an ethical problem or dilemma; *ethical reflection and analysis* enable us to think critically to identify and weigh our ethical obligations and priorities; and *ethical decision making* is a method of ensuring that the action we take is well reasoned and can be justified. Finally, *moral courage* enables us to act on our decisions even under the most challenging circumstances.

Each individual has his or her own personal moral comfort zone within which ethical reflection and analysis occur. This comfort zone is both influenced by societal concepts of morality and unique to the individual and his or her own ethical foundations. Most of us do not give much thought to our ethical comfort zone. We think of ourselves as being ethical without entirely understanding how we act ethically in practice or why we so often falter ethically when confronted with difficult choices. Knowing and understanding who you are as a moral being, how you think ethically, and why you make certain decisions are critical to ethical practice as a nurse.

The various approaches to ethics begin with *metaethics,* the branch of philosophy that considers fundamental questions about the nature, source, and meaning of concepts such as good and bad or right and wrong. Metaethics provides a foundation for how to think about right and wrong or good and bad, and it provides a common language to use when considering the ethical or moral dimensions of a situation.[1]

Normative ethics, on the other hand, deals with very specific judgments about right and wrong in everyday actions. Normative ethics uses the language of ethics, along with factual

Fig. 42.1 Scope of Concept: Ethics.

information, prior experience, commonly held values and beliefs, and acceptable standards of behavior, to make everyday judgments.[1]

Finally, when faced with a moral choice, *applied ethics* refers to the process of applying ethical theory and reasoning to daily life. Applied ethics is sometimes also referred to as *practical ethics*,[2] and it provides the justification for specific actions based on ethical reflection and reasoning.

SCOPE

The scope of ethics is broad, encompassing many different dimensions of our lives. For example, we all live and work within larger systems, each of which has its own moral and ethical dimensions. We are all members of a larger society, we work in organizational settings, and we function within the parameters of a particular profession. To fully understand the scope of ethics, one must consider how each of these dimensions interacts with us as individuals in shaping our ethical foundations and behaviors (Fig. 42.1).

Societal Ethics

At the top, there are societal ethics that serve the larger community. Society provides a strong normative basis for ethical behavior through the legal and regulatory systems. Law is a minimum standard of behavior to which all members of society are held and that, generally, serves the interests of society as a whole. Fraud, abuse, and unauthorized release of medical information are examples of behaviors that society has deemed unethical and which are prohibited by law. Legal standards such as the clinical standard of care, liability, negligence, and malpractice are based on legal and ethical obligations owed to patients. Other areas of our professional lives are guided by regulatory parameters such as the practice act that defines educational requirements and scope of practice as a nurse or the accreditation standards that determine how a healthcare facility must operate. Compliance with these minimum standards is expected of all healthcare professionals and the organizations within which they practice.[3] Following the law is the most basic ethical standard required for the privilege of working as a licensed professional in health care. However, even as a minimum standard, law can create moral conflict for nurses, which is evident in issues such as abortion and provider-assisted dying, on which there remains broad disagreement within society.

Organizational Ethics

Organizational ethics involves a set of formal and informal principles and values that guide the behavior, decisions, and actions taken by members of an organization. These principles and values are expressed in the organizational systems, practices, policies, and procedures developed to ensure ethical operation. The billions of dollars spent annually as a result of healthcare fraud and abuse is an example of ethical failures at the level of the organization.[4] Ideally, organizational ethics directs all aspects of an organization and its culture, from its mission and values to how it treats customers and its employees, its financial practices, and how it responds to the needs of the larger community and the environment.[5]

Professional Ethics

Professional ethics refers to the ethical standards and expectations of a particular profession. Because professions have held a privileged role in society, their members are often held to a higher ethical standard. Therefore, ethics becomes a fundamental element of one's professional identity and character as a nurse. As stated by Crigger and Godfrey, "*The relationship between the patient and the nurse is, first and foremost, an ethical one*."[6] Ethical standards and expectations of practice are often expressed in a code of ethics or code of conduct that embodies the unique demands and philosophies of a particular profession. Unlike the minimum standard of the law, professional codes of ethics tend to offer general guidelines that are aimed at the highest ideals of practice. The *Code of Ethics for Nurses* of the American Nurses Association (ANA)[7] establishes clear priorities (such as compassion, respect, and primary commitment to the patient) in the ethical practice of nursing and advocacy for patient rights. For example, the first provision in the Code of Ethics for Nurses[7] states, "*The nurse practices with compassion and respect for the inherent dignity, worth and unique attributes of every person*."

Although this is an admirable ideal, how many of us can say that we live our lives or practice our professions in ways that always treat others with perfect compassion and respect, valuing every individual equally and without any form of bias? Instead, it is the responsibility of individual nurses to interpret this statement in terms of what it means in each unique situation and how well or poorly it is being demonstrated in their professional practice.

Bioethics and Clinical Ethics

Bioethics and its subcategory of clinical ethics are closely related to professional ethics. *Bioethics* deals broadly with ethical questions surrounding the biologic sciences, emerging healthcare technologies, and health policy. *Clinical ethics* is involved primarily with decision-making at the bedside and other patient-specific issues. *Research ethics* is a specialized field within bioethics that examines the ethical conduct of research using human subjects and animals.

Personal Ethics

Finally, and perhaps most important, personal ethics describes an individual's own ethical foundations and practice. Our

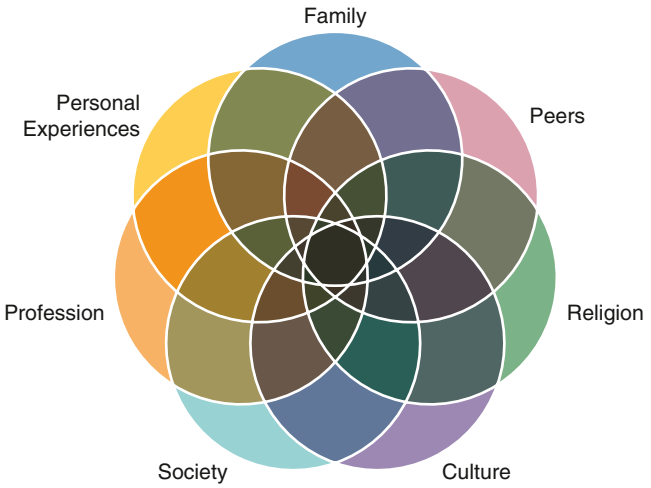

Fig. 42.2 Sources of Ethics.

personal ethics continuously intersects with these other categories of ethics; however, they do not perfectly overlap, so there is much potential for conflict. In addition, the sources of our ethics change over time just as we continue to change with time.

ATTRIBUTES AND CRITERIA

The attributes of ethical nursing practice begin with the sources of ethics and involve skills and abilities needed to identify and distinguish ethical problems and dilemmas and then apply a disciplined approach to analysis and action.

Sources of Ethics

The beliefs, values, and methods that define ethical practice are influenced by a variety of sources. Natural intersections and places of agreement exist between the various sources; however, they can also conflict with each other, creating competing beliefs and inconsistencies in the ways we approach ethical issues (Fig. 42.2).

Family initially forms the most powerful influence on ethics, providing many of our earliest lessons about "right and wrong." A similar influence is the culture in which we are raised, including cultural practices related to our ethnicity, geographic area, socioeconomic status, and faith tradition. Peers become a source of ethical awareness and practice, especially as we move into adolescence, expand beyond family influences, and are exposed to new experiences in the larger world. Education introduces new ways of thinking about difficult issues. Professional education, in particular, is charged with both your technical training and your awareness of the ethical practice of the profession. Once in the workplace, your colleagues and the organization where you work may further alter your views and your behaviors.

Ethical Problems and Dilemmas

An *ethical problem* is simply a problem with an ethical dimension. Most ethical problems have a reasonably clear solution, whereas others can be quite complex or involve competing ethical priorities. An *ethical dilemma* involves a problem for which in order to do something right you may risk doing something wrong. For example, to be loyal to one friend, you have to be disloyal to another. An example in patient care is determining whether aggressive treatment at the end of life will cause more harm than benefit. In other words, it is not possible to meet all of the ethical requirements in the situation. Instead, you must be sensitive to the ethical dimensions of the situation, able to use ethical concepts to analyze and reflect on the ethical conflicts within the dilemma, determine an ethically justifiable solution, and take action.

Ethical sensitivity, or *ethical awareness,* is the first step in recognizing an ethical problem or dilemma. Although ethics education often relies on dramatic life-and-death examples, even the most common, everyday scenario with a patient has potential ethical implications. For example, late charting, a minor medication error, or simply refusing to allow a visitor to stay past normal visiting hours can cause avoidable harm to a patient.[8]

Ethical Analysis and Decision Making

When faced with an ethical problem or dilemma, it is helpful to apply a systematic approach of ethical analysis to the decision-making process. There are many different methods for ethical analysis.[9] A practical approach is to use some form of decision model, and there are a number of different decision models from which you might select.

One popular model for clinical decision making is the four topics method of Jonsen et al.[10] The four topics are medical indications, patient preferences, quality of life, and contextual features. Within each topic, questions are posed that clarify factual aspects of the case and relevant ethical principles. Answering the various questions provides a framework within which different options for action can be considered.

Any approach to ethical analysis will depend heavily on one's ability to ask good questions. Asking the wrong question or failing to ask an important question will generally result in a wrong or incomplete answer. An *ethical question* is a question that challenges you to consider a particular ethical concept, principle, or perspective in your analysis. Examples of ethical questions are:

- Do I have a duty to tell the truth?
- What is the greater harm?
- To whom is my primary loyalty?
- What are the best interests of my patient?
- Will my action be fair and equitable?

Framing good ethical questions is the key to strong ethical analysis, and the ability to use a variety of ethical concepts and theories naturally expands the range and quality of questions.

THEORETICAL LINKS

The study of ethics can be traced back to philosophers of the ancient world, such as Aristotle in the West and Confucius in the East. In medicine, the Hippocratic Oath is dated to sometime near the fourth century BCE.[11] The body of theory in ethics is vast, reflecting the diversity of human thought and action.

Think of each theory or principle as a camera lens. Different lenses have different magnifications and filters that allow us to view exactly the same scene but from a different angle or in a slightly different light. This body of ethical theory provides the

"language of ethics" and allows us to explore situations from many different perspectives and points of view. The perspectives can be quite diverse; therefore, most of us feel more strongly about some principles and are drawn toward one or two theories at most. We may have a very difficult time even trying to think in the language of other theories. Ethical conflict occurs between parties when this language fails and each party simply cannot understand the other party's reasoning or point of view.

Ethical Principles

An ethical principle is a general guide, basic truth, or assumption that can be used with judgment to help determine a course of action.[12] Principles have long been used in bioethics and clinical ethics to describe the most common ethical concerns one must consider in most cases. Although all the principles are important, they can conflict with each other in certain situations. The four principles most often cited are respect for persons, nonmaleficence, beneficence, and justice.[12] Less often mentioned, but equally important, is the principle of fidelity.

Respect for Persons

Respect for persons simply maintains that human beings have an unconditional moral worth that requires us to treat each individual person with great value, dignity, and respect. The ethical principle of *autonomy* is an important extension of respect for persons and suggests that patients must be treated in a way that respects their self-determination by expressing their wishes and making informed choices about their treatment. Another ethical principle closely related to autonomy is *veracity* or the principle of truth telling. A patient is not able to make an informed choice about treatment unless he or she has received the truth about his or her condition and the proposed treatment, and in a manner that is understandable to the patient.

Nonmaleficence

Nonmaleficence directs us to act in ways that avoid harm to others, including even the risk of harm. In health care, the primary focus is on harms such as pain, disability, or death; however, harm is difficult to define, and both patients and providers may be concerned about a wide range of perceived harms.[12] Another challenge in health care is that we are often required to inflict some harm and risk in order to benefit the patient and avoid a greater harm. However, these harms are not avoidable if we are to properly treat the patient, so we are required to carry out such treatments in ways that minimize undue risk or needless harm.

Beneficence

Beneficence is an obligation to do good by acting in ways that promote the welfare and best interests of others.[12] Patients can reasonably expect that you, as a nurse, will promote their health and well-being. However, much like harm, the concept of good is difficult to define. A patient may define his or her best interests very differently than the nurse or other healthcare professional.

Justice

The concept of *justice* is particularly complex, and there are no universally accepted definitions of what constitutes justice. However, at a minimum, the principle of justice is concerned with treating people equitably, fairly, and appropriately.[12] This means we owe our patients care and treatment that do not arbitrarily discriminate against them as an individual or as a member of a class of individuals. Returning to the ANA's Code of Ethics for Nurses, justice is the underlying principle that prohibits a nurse from treating patients differently based on their social or economic status, their personal attributes, or the nature of their health problems.[7] Each patient is entitled to the same level of care and consideration. Also of concern is the concept of distributive justice and the allocation of scarce healthcare resources. For example, should patients receive healthcare resources based on an equal share, what they need, or what they deserve based on contribution or effort? The persistence of disparities in health outcomes between racial, ethnic, gender-based, and other vulnerable groups is one of the greatest challenges faced by the healthcare system[13] Related concepts include compensatory justice, such as occurs in a malpractice settlement, and procedural justice, which requires a system of fair treatment such as the system for allocating organs to people on the waiting list.

Fidelity

Fidelity is the principle that requires us to act in ways that are loyal. In the role of a nurse, such action includes keeping your promises, doing what is expected of you, performing your duties, and being trustworthy. Fidelity sounds easy enough, but it is probably the most frequent source of conflict for healthcare professionals because they owe loyalty to so many parties. In any particular situation, nurses may find themselves at odds between what they believe is right and what is in their own self-interest, what the patient or family wants, what other members of the healthcare team expect, what organizational policy dictates, or what the profession or the law requires.

Ethical Theories

There are many ethical theories, and we can only highlight a few major approaches in very simplified terms. Each theoretical approach offers a very different view of the same situation—views that may or may not lead to similar conclusions about an ethical problem or dilemma. For example, most of us have a preference for the consistency of rule-based approaches or the flexibility of consequence-based approaches. Likewise, some of us will be more comfortable with the highly contextual and emotionally engaged approach of relational ethics, whereas others are more comfortable with a highly rational and detached approach to ethical analysis.

Ethics of Duty

An ethics of duty is based on an approach in which moral duties are seen as self-evident, needing no further justification. Moral action is then based on acting according to a specific duty simply because it is the right thing to do.[14] Although the consequences of our actions are important, they are a secondary consideration to duty and our intention to do the right thing. The ethical question posed is, "What is my duty?" For example, if a nurse becomes aware that a friend and colleague has been diverting narcotics because she has developed an addiction, and

the nurse reports her friend to her supervisor because that is what the organizational policy requires, she is complying with her ethical duty to report.

Ethics of Consequences

An ethic of consequences is based on the view that moral actions are defined entirely on the basis of the outcomes or consequences of an action. Reaching a particular goal is what defines the ethical justification of an act regardless of your sense of duty or moral intent.[14] Consequence-based theories often weigh the advantages and disadvantages, or the harms and benefits, of different actions in the same situation. For example, utilitarianism assumes that a moral action is one that results in the greatest good for the greatest number. The basic ethical question posed is, "What action will promote the greatest good with the least harm?" For example, if the nurse mentioned previously reports her friend because she is concerned that some patients are being harmed when their pain medications are diverted and all patients are at risk if her friend is practicing under the influence, then her actions are primarily based on a consideration of consequences. Her goal is to protect as many patients as possible rather than following a particular rule as a matter of duty. In fact, she might act outside of the policy if she believed reporting would not result in appropriate action by her supervisor.

Ethics of Character

Theories that emphasize character are classified under the general category of virtue ethics. Unlike the ethics of duty or consequences, which use external principles and rules to guide actions, virtue ethics relies on the character of the individual as the primary source of moral action. Character develops over time based on life experiences and our willingness to reflect on our actions and motives. Virtues are character traits that predispose a person with good intentions to act with practical wisdom. Moral virtues include respect, honesty, sympathy, charity, kindness, loyalty, and fairness, whereas practical virtues include intelligence, patience, prudence, and courage.[14] In general, a moral act must both promote good and intend good based on the moral predispositions of our character. The basic ethical question might be, "What is the wise action to take?"

Arguments are emerging for virtue theory to be the core of nursing ethics. Crigger and Godfrey argue for an emphasis on the virtues of compassion, integrity, humility, and courage.[6] In particular, the virtue of courage lies at the heart of ethical practice. It is one thing to know what a right action should be and another to have the courage to take the action. The concept of virtue has been central to the definitions of professionalism and professional identity.[6] Common criticisms of virtue ethics are that character varies between individuals, leading to ethical inconsistency, and our choices may change over time with additional experience and character development. However, a strength of a virtue-based approach to nursing ethics is that it assumes character must be continually developed and refined in practice throughout a nurse's career. Ethics is a dynamic element of practice that cannot be reduced to simple habits of following rules or weighing outcomes. In the case of our nurse with the impaired colleague, a character-based approach would lead her to act based on a combination of her own good intentions to protect her friend, the patients, and the organization while also seeking the best possible outcome for all. She would be guided primarily by a combination of her own moral and practical virtues, of her professional sense of identity and her moral intuition, rather than by the externally dictated rules and consequences.

Ethics of Relationship

Ethical theories that emphasize relationship are focused on the nature and obligations inherent in human relationships and community. Examples of theories that are consistent with the history of nursing ethics include feminist ethics and social justice, both of which address vulnerability and issues of power affecting patients and communities.[15] The ethic of care approaches difficult ethical situations in a context-specific manner that searches for solutions in the particular details of the situation. Universal principles are used only to the extent they can be applied based on the unique circumstances of each situation. Primary attention is paid to preserving relationships, improving communication, enhancing cooperation, and minimizing harm to everyone involved while promoting an ideal of caring. The basic ethical question in the ethic of care might be, "What is the caring response?"

Such an approach is very different from the highly abstract, rational, unemotional, and rule-oriented approach of most Western ethical traditions that have dominated the fields of bioethics, clinical ethics, and medical ethics (physicians). However, nursing has long embraced an ethic of care and other relational approaches. Returning once more to our nurse with the impaired colleague, the ethic of care will direct her first toward gaining a full and empathetic understanding of the context of the situation, including the various relationships that must be protected and preserved if possible. She will seek open communication and a collaborative approach that emphasizes caring and minimizes harm to all parties. For example, she might first approach her friend and offer to accompany her to speak with the appropriate party in the organization to arrange for treatment and address the legal implications of her actions.

CORE COMPETENCIES

Ethics

- Recognize and apply common ethical principles and frameworks for analysis and decision making when encountering ethical dilemmas in professional practice.
- Interpret and apply the nursing code of ethics and standards of care in all patient care and professional nursing situations.
- Reflect critically on one's personal and professional character and moral foundations in relation to the role and responsibilities of the nurse.
- Demonstrate moral sensitivity, personal accountability, and ethical behaviors in all aspects of the nursing role.
- Exhibit integrity and moral courage in advocating for practices and policies that promote patient safety, equitable care, and social justice.
- Protect patient rights, including autonomy, privacy, and confidentiality.
- Display respect, humility, cultural sensitivity, and an attitude of inclusivity with patients and colleagues.
- Apply strategies for self-care, coping with moral distress and building moral resilience

CONTEXT TO NURSING AND HEALTH CARE

Applied ethics addresses the process of ethical analysis and decision making in actual cases or with respect to specific topics. Although the range and complexity of ethical theory can be daunting, applied ethics is fairly straightforward insofar as you have a specific decision that needs to be made and you are free to incorporate any ethical concepts you consider relevant to making that decision. Ethical competencies in nursing focus on the knowledge and abilities needed to identify and resolve ethical conflict and maintaining ethical integrity and awareness in all professional nursing interactions.

Ethical Decision Making in Practice

There will be times when you must assess a situation and make a difficult ethical decision on your own. However, healthcare decisions are generally not made in a vacuum, and the nurse is often participating in ethical decision making as a member of an interprofessional patient care team or an administrative team. Although there is likely to be some conflict when people with different perspectives are involved, such conflict can be used to enhance the depth and breadth of the analysis by forcing everyone to consider the situation from various viewpoints. Therefore, group or team decision making can often result in a more refined solution.

When conflict within the team or between the team and the patient or patient's family cannot be resolved, an organizational ethics committee can be consulted to assist with mediating the conflict. Most acute care hospitals and some extended care facilities have an ethics committee onsite or they have access to one. An ethics committee does not make clinical decisions; however, the assigned consult team or the full committee can guide the discussion and act as mediator when there is conflict among the parties.

For organizational issues such as adherence to regulations, safety standards, quality of care, conflict of interest, or billing fraud and abuse, most organizations have a compliance committee or compliance officer, and they may even offer a compliance hotline for reporting of suspected violations. When the dilemma involves other professional issues, state and local chapters of professional associations may have similar ethics committees or experts with whom one can consult.

Ethical Issues in Nursing

A large study conducted by Fry and Riley examined (1) the ethical issues encountered by registered nurses (RNs) in their practice, (2) the frequency that ethical issues occur in practice, (3) the degree to which RNs are concerned by these issues, (4) the way RNs handle ethical issues, and (5) the types of ethics education topics and resources that RNs perceive as helpful in practicing ethically.[16] According to the study findings, the most frequent ethical issues experienced by RNs are

- Protecting patients' rights and human dignity
- Respecting/not respecting informed consent to treatment
- Providing care with possible risk to the nurse's health
- Using/not using physical or chemical restraints
- Working with staffing patterns that limit patient access to nursing care

Issues that RNs find most disturbing include:

- Coping with staffing patterns that limit patient access to nursing care
- Prolonging the living/dying process with inappropriate measures
- Not considering the quality of a patient's life
- Implementing managed care policies that threaten quality of care
- Working with unethical/impaired colleagues

More than 30% of the respondents reported encountering ethical issues in their practice one to four times per week or daily. In handling their most recently experienced ethical issue, more than 83% reported that they discussed the issue with nursing peers, whereas more than 66% discussed the issue with nursing leadership. On the other hand, more than 5% of the nurses reported that they did not deal with the ethical issue at all.[16]

Moral Distress

There has been much research on moral distress, with evidence of moral distress within all healthcare disciplines.[17–20] *Moral distress* occurs when one is unable to act upon what they believe is the morally appropriate action or when one otherwise acts in a manner contrary to their personal and professional values because of perceived or actual institutional, procedural, or social constraints.[17] In other words, a person knows what to do, but believes they cannot do it because of internal or external barriers. Self-doubt, lack of assertiveness, and the perception of powerlessness are examples of internal barriers. External barriers include inadequate staffing, lack of organizational support, poor relationships with colleagues, and policies that conflict with the care needs of patients.[17]

Situations that have been shown to cause moral distress are very similar to the common ethical issues noted previously. Many occur in end-of-life situations and involve what is perceived to be overly aggressive treatment and inappropriate use of resources. Working with other physicians and nurses who one considers incompetent is another common situation that has been shown to result in moral distress.[21]

An expanded study of moral distress and its effects on nursing practice occurred as a result of the COVID-19 pandemic.[22–24] Factors leading to moral distress during the pandemic include (1) lack of knowledge and uncertainty regarding how to treat a new illness, (2) being overwhelmed by the depth and breadth of the COVID-19 illness, (3) fear of exposure to the virus leading to suboptimal care, (4) care team tensions and miscommunications, (5) policies to reduce viral transmission (visitation policy and PPE policy), (6) practicing within crisis standards of care, and (7) dealing with medical resource scarcity.[22–24]

The effects of moral distress occur in two parts.[17] When the situation first occurs, moral distress can result in frustration, anger, guilt, anxiety, withdrawal, self-blame, and other stress-related symptoms. The second part of moral distress is referred to as *reactive distress* or *moral residue,* and it is characterized by lingering feelings that can accumulate over time with each subsequent experience of moral distress. At least three patterns

of response to moral residue have been described. In the first pattern, a heightened response leads healthcare professionals to engage in activities of conscientious objection, such as voicing opposition to a plan of care or refusing to follow orders. In the second pattern, they experience a desensitization with a tendency to be passive or to simply withdraw from situations in which they feel ethically challenged. The third pattern is characterized by strong, ongoing physical and psychological stresses that often lead to burnout and leaving the profession.[17] In all cases, the healthcare professional's core values, integrity, and professional identity have been undermined.

Moral resilience is an emerging concept used to describe the ability of individuals to cope with ethical dilemmas and moral distress and restore integrity. Focusing on self-care is an important component of moral resilience. In addition, your ability to recognize ethical problems and apply ethical thinking and problem solving are two important strategies for avoiding moral distress.[25]

Because of the strong negative effects of unresolved moral distress on the job satisfaction and retention of nurses and other healthcare professionals, leaders in healthcare organizations are becoming aware of the need to create an organizational climate in which ethical issues can be openly discussed and resolved.[25–27] Interventions have included ethics debriefings, more support for ethics committees, and better access to ethics education and other resources.

INTERRELATED CONCEPTS

As evident in Fig. 42.3, ethics is closely intertwined with many other concepts related to nursing. **Health Policy**, **Health Care Law**, and **Health Care Economics** can all be the source of both ethical guidance and ethical conflict. For example, legal requirements may provide guidance in most situations but may create conflict in a specific situation that does not quite fit the context for which the legal requirement was intended. **Professional Identity** is contingent upon a conception of ethical practice.

The concepts **Health Care Quality**, **Safety**, **Evidence**, **Collaboration**, and **Technology and Informatics** are all grounded in ethical obligations such as preventing needless harm, acting in a patient's best interest, ensuring the best outcomes for the most patients, and serving as a good steward of scarce healthcare resources. The concept of **Leadership** has additional ethical obligations, such as balancing loyalties and the interests of patients, employees, the organization, and the community.

Patient care and the process of nursing are fraught with ethical problems and dilemmas. For example, the ethical practice of nursing requires that the nurse treat each patient with respect, recognizing and responding to each patient's unique experience of illness and injury; however, ethical challenges can arise at the intersections of **Person-Centered Care**, **Diversity, Equity, and Inclusion**, and **Health Disparities and Health Equity**. Ethical issues in the context of a **Public Health Emergencies** can create challenges for nurses.

CLINICAL EXEMPLARS

Nurses practice in a wide variety of settings, and ethical issues can vary by setting. The scope of ethical issues can be generally examined across the broad categories of clinical, organizational, and health policy issues, with many issues falling into more than one category. Clinical issues can be further subdivided into those at the beginning of life, across the life span, and at the end of life. Box 42.1 provides an expanded list of examples of potential ethical issues faced in nursing practice. It is beyond the scope of this text to describe all of these exemplars; however, a few are featured here.

Fig. 42.3 Ethics and Interrelated Concepts.

Featured Exemplars

Pain Management and Addiction

For many complex reasons, the use and misuse of opioid pain medication has reached epidemic proportions, resulting in rapidly rising levels of addiction and overdose. A healthcare provider's basic obligation to relieve pain may well conflict with the best interests of a patient when pain management crosses the line into misuse or addiction. Health policy initiatives, regulatory interventions, and shifting or competing standards of care combine to render pain management unusually challenging for both individual providers and healthcare organizations.

Confidentiality

Confidentiality is an issue that can arise across the life span in many situations. A particularly complex dilemma involves mandatory reporting of potential domestic or elder abuse. The legal duty to report may be very much at odds with the patient's wishes and may result in unwanted intervention and disruption in the patient's life.

Advance Directives

Advance directives for health care pose many dilemmas at the end of life. A patient's autonomous wishes, or what we think the patient wanted based on the directive, may be strongly opposed by the family or the healthcare team. Patients themselves may change their minds when faced with the reality of their directive.

Uncompensated Care

Organizations face numerous ethical challenges. A common source of ethical conflict for healthcare organizations and their employees is ensuring high-quality and cost-effective operations while also maintaining safe levels of staffing, purchasing current technologies, and continuing to deliver necessary but unreimbursed care to uninsured or underinsured patients.

Ethics During Crisis

Many aspects of healthcare delivery must be altered to cope with a crisis such as a natural disaster, episode of mass violence, or an epidemic. The COVID-19 pandemic provides many examples of such ethical issues including issues in care at the bedside; organizational issues such as staff safety and allocation of scarce resources; local, state and national policy issues; and ethical challenges in research. Box 42.2 presents many of the ethical issues faced by nurses and the healthcare system during the pandemic.

BOX 42.1 EXEMPLARS OF ETHICS

Clinical Ethics and Bioethics

Beginning of Life

- Abortion
- Assisted reproduction
- Child abuse
- Complications of pregnancy
- Emergency contraception
- Genetic enhancement
- Minor consent to or refusal of treatment
- Prenatal genetic selection
- Prenatal genetic testing
- Severely impaired newborns

Lifespan

- Confidentiality
- Cultural conflicts
- Decisional capacity
- Domestic and elder abuse
- Genetic testing
- Informed consent
- Pain management and addiction
- Patient noncompliance
- Patients as research subjects
- Protecting patient rights
- Provider bias

End of Life

- Advance directives
- Cardio pulmonary resuscitation orders
- Chronically critically ill
- Nonbeneficial treatment
- Organ allocation
- Organ procurement
- Proxy decision making
- Terminal sedation
- Withholding or withdrawal of life support

Organizational Ethics

- Allocation of scarce resources
- Conflict of interest
- Disclosure of medical errors
- Fraud and abuse
- Impaired providers
- Inadequate staffing levels
- Patient safety
- Provider conscience policies
- Uncompensated care
- Mandatory vaccination of health workers
- Use of restraints

Health Policy Ethics

- Allocation of research funding
- Health care for the uninsured
- Health care for undocumented immigrants
- Health insurance reform
- High cost of prescription drugs
- Medical marijuana
- Opioid misuse prevention, harmreduction,andtreatment
- Privacy of health information
- Provider-assisted dying
- Reproductive rights
- Rural access to health care
- Drug shortages
- Disparities in care among vulnerable populations

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

BOX 42.2 SELECTED ETHICAL ISSUES IN NURSING DURING THE COVID-19 PANDEMIC

Issues in Direct Patient Care

- Crisis standards of care including practice outside one's normal scope
- Lack of evidence-based practice standards
- Duty to care despite fear of exposure
- Unfamiliar models of team care and communication
- Limited family visitation policies
- Allocation of scarce clinical resources including drugs and equipment
- Patient or family demands for untested treatments

Organizational Issues

- Scare resources such as personal protective equipment and staffed beds
- Mandatory vaccination of healthcare workers
- Substandard conditions of care as a result of overcrowding and staffing
- Limiting access to elective, primary and specialized care
- Employee safety from abusive or aggressive patients and family members

Health Policy Issues

- Allocation of scarce resources such as PPE and vaccines
- Local and state mandates or lack of mandates for public health measures such as masks and vaccines
- Conflicting information related to public health advice

Research Issues

- Safety testing and approvals for use of new drugs including vaccines
- Publication of research prior to peer review
- Healthcare providers distributing untested drugs and alternative treatments

CASE STUDY

From Thomas Northcut/Digital Vision/Thinkstock.

Case Presentation

Josh is a pleasant and intelligent 17-year-old male who was diagnosed with an aggressive bone cancer and underwent amputation of his left leg; however, his cancer has now metastasized to his chest, skull, and lungs. Josh and your son have been friends at school for years, and you knew him before his illness. Since then, you have been his nurse on occasion and he has talked to you about his disease. He has told you that talking about it upsets his parents and makes his friends uncomfortable, so it is nice to have someone with whom he can be honest. You have always been impressed with the maturity and insight he demonstrates.

Josh has been readmitted, his prognosis is grim, and he is experiencing a great deal of pain. Although you have not been assigned to care for him, you are aware that members of the clinical team have struggled with an ongoing request by Josh's parents that the healthcare personnel limit the information they share with him. Despite the many questions he asks, Josh has not been told the extent of the metastases or that he will likely die within a few weeks. Members of the care team have frequently omitted information and even lied to Josh at the insistence of his parents and with the reluctant agreement of his attending physician. Members of the care team have questioned the unit director several times; however, she continues to instruct them to respect the wishes of the parents to avoid any legal problems. Josh's parents also insist that he continue to receive every possible intervention, and another clinical trial is being considered.

One evening, Josh notices you in the hall and calls you into his room. He confronts you and tells you he knows he is not being told everything. He says he believes he is dying and, although it frightens him, he is ready to die. He has not been able to attend school for several months, his friends no longer come to see him, he knows his younger brother and sister get very little attention because of him, and he is in nearly constant pain. He is tired of pretending to be "strong and brave." He has tried to talk to his parents, but they refuse to even listen to him. He says, "I trust you to tell me exactly what's happening and what I need to do to stop treatment, even if it is against my parents' wishes."

Case Analysis Questions

1. What is the primary ethical dilemma presented in this case?
2. Consider Fig. 42.1. Which of the elements of ethics presented in the Scope of Ethics apply to this case?
3. As a nurse, what ethical principles and approaches should be considered in your response and how should these be prioritized?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 43

Diversity, Equity, and Inclusion

Jean Edward and Hartley Carmichael Feld

Diversity, Equity, and Inclusion (DEI) is a concept cluster composed of three unique concepts that are often used interchangeably and/or simultaneously in reference to initiatives committed to improving outcomes at the individual, organizational, and community levels. In healthcare organizations, these concepts come together synergistically via DEI initiatives, which are centered around diversifying the healthcare workforce, promoting equity in access to care for patients and communities, and fostering inclusive environments in which nurses and patients are treated fairly, have access to equal opportunities, and feel respected and valued. Nurses play a central role in representing and recognizing diversity, engaging in inclusive behaviors, and ensuring care delivery that is equitable and socially just. Upholding and advocating for equity through their practice can have a direct effect on a nurse's ability to provide safe, high-quality care that helps reduce health disparities, and improve health outcomes for their patients.[1,2] Furthermore, nurses are morally and ethically responsible for upholding the core professional values of respect, dignity, altruism, and justice, which closely correspond with the concepts of DEI.[3] Justice, which refers to the level of fairness that nurses must engage in when treating patients, regardless of a patient's abilities, race/ethnicity, religion, gender, sexual orientation, etc., is a core principle in the nursing code of ethics.[4]

The American Association of Colleges of Nursing (AACN) refers to DEI both collectively and independently as featured concepts associated with professional nursing practice; DEI is also integrated within the core competencies of nursing education and practice.[5] Preparing nurses to effectively care for an increasingly diverse population is vital to addressing the unique needs of patients and growing health disparities. Leaders in nursing education and practice have emphasized the pivotal role of nurses in promoting DEI and health justice initiatives to improve population health and reduce health inequities.[6]

DEFINITION

The subconcepts of DEI (i.e., diversity, equity and inclusion) are closely interrelated and often used concurrently in the context of nursing and health care as they have several overlapping features. However, each of these subconcepts have unique definitions. *Diversity* refers to a "broad range of individual, population, and social characteristics, including but not limited to age; gender identity; race; ethnicity; sexual orientation; family structures; geographic locations; national origin; immigrants and refugees; language; physical, functional, and learning abilities; religious beliefs; and socioeconomic status."[7] *Equity* is defined as the ability to recognize differences in resources that serve as obstacles to being able to fully participate in society and to ensure fair and equitable allocation of resources so that everyone can overcome obstacles and have access to the same opportunities.[8] *Inclusion* is defined as "a sense of belonging: feeling respected, valued, and seen for who we are as individuals; and a level of supportive energy and commitment from leaders, colleagues, and others so that we – collectively and individually – can do our best work."[9] Fostering this sense of belonging requires intentionality where diverse voices and perspectives are valued, embraced and celebrated and have an equal voice at the table. For the purposes of this concept presentation, DEI as a concept cluster in the context of nursing and healthcare is broadly defined as *an intersection of three components, diversity, equity, and inclusion, resulting from an organizational and individual commitment to health equity and justice.* This commitment to health justice is central to DEI initiatives as it represents a dedication to dismantling systemic health inequities.

SCOPE

To capture the full scope of DEI, we must first start with an understanding of the scope of each of its subconcepts. The scope for *diversity* ranges from optimal diversity, wherein multiple voices from diverse backgrounds are represented, to lack of diversity, wherein the viewpoints of only one homogenous group are represented. *Equity* ranges from equitable circumstances, wherein customized tools are available to help overcome barriers to opportunities and resources, to inequity, wherein there is unequal access to opportunities and resources. *Inclusion* can range from experiencing a sense of belonging, wherein individuals from diverse backgrounds feel accepted, heard, and appreciated, to feeling a lack belonging, wherein those from diverse groups feel excluded and marginalized. Examples of exclusionary behaviors

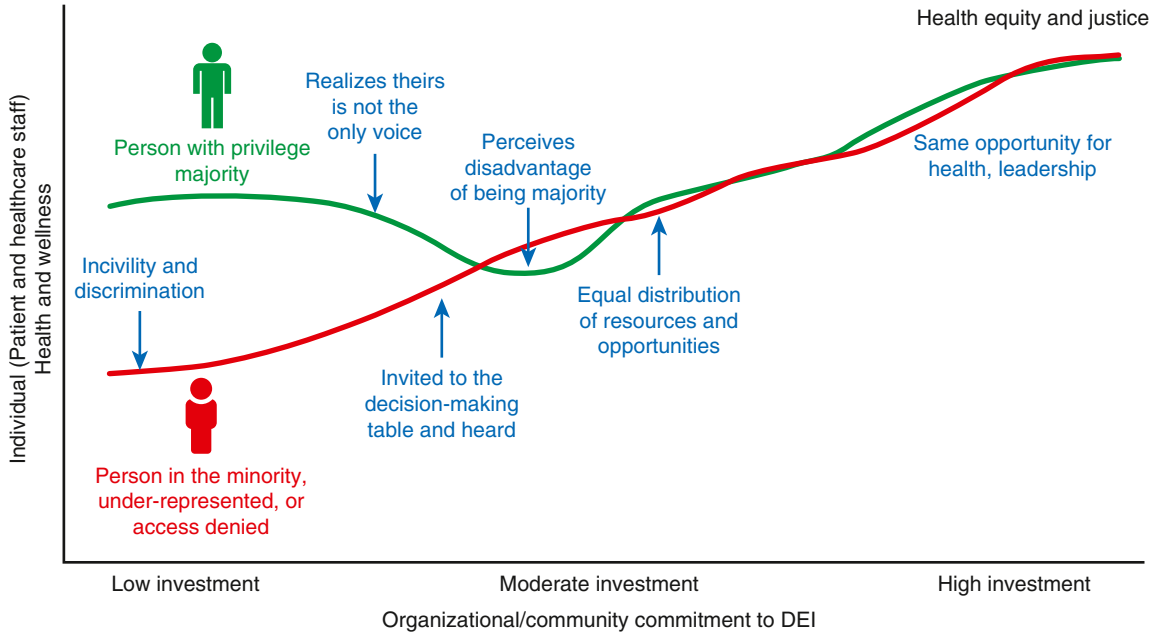

Health equity and justice
Individual (Patient and healthcare staff) Health and wellness
Person with privilege majority
Realizes theirs is not the only voice
Perceives disadvantage of being majority
Same opportunity for health, leadership
Incivility and discrimination
Equal distribution of resources and opportunities
Invited to the decision-making table and heard
Person in the minority, under-represented, or access denied
Low investment
Moderate investment
High investment
Organizational/community commitment to DEI

Fig. 43.1 Scope of Concept: Diversity, Equity, and Inclusion. *DEI*, diversity, equity, and inclusion.

in the healthcare setting include incivility, microaggressions, racism, discrimination, bullying, and workplace violence.

The scope for the concept cluster of DEI ranges from low investment to high investment in organizational/community commitment to prioritizing diversity, equity, and inclusion. This concept cluster includes the effects it has on individuals (patient and healthcare staff, including nurses), health, and wellness (Fig. 43.1). When investment is low, there is lack of commitment, prioritization, and synergy toward DEI, which has a negative effect on individual health and wellness. When there is synergy and meaningful high investment in DEI over time, the result is health equity and justice. Health and wellness can still be high for persons of privilege or who are in the majority, but low for those who are underrepresented.

The ultimate societal goal when bringing synergy to the subconcepts of DEI is health equity and justice. Health justice is defined as the achievement of health equity and social justice when "all persons have the same chance to be free from hazards that jeopardize health, fully participate in society, and access opportunity."[10] When health justice is achieved, all people have the same odds of being healthy and the burden of disease is distributed equally across all populations.

ATTRIBUTES AND CRITERIA

There are several elements to consider when identifying the major attributes of DEI, or the characteristics that are typically associated with the concept. The major attributes and criteria that are discussed pertain to DEI within nursing and healthcare organizations. The three subconcepts of diversity, equity, and inclusion are key attributes of DEI with substantial overlap (Fig. 43.2).

Diversity is characterized by the representation of individuals from various backgrounds within the healthcare workforce that reflects or represents the diverse characteristics of the patient population or communities they serve.[11] The primary or

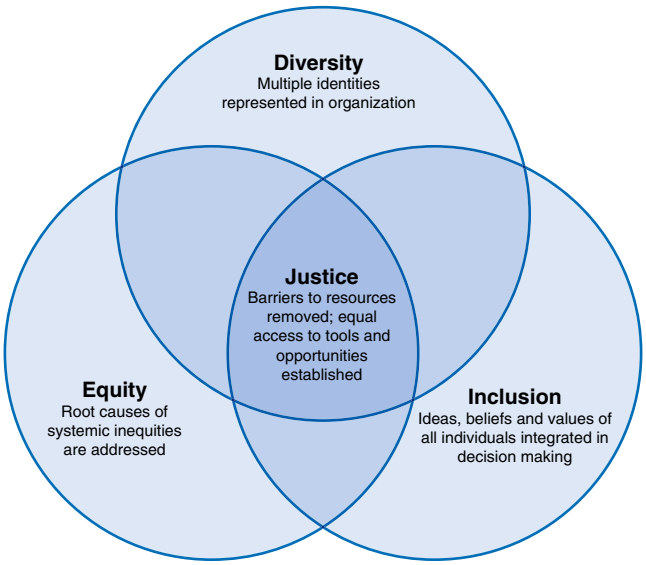

Diversity
Multiple identities represented in organization
Justice
Barriers to resources removed; equal access to tools and opportunities established
Equity
Root causes of systemic inequities are addressed
Inclusion
Ideas, beliefs and values of all individuals integrated in decision making

Fig. 43.2 The Attributes of Diversity, Equity, and Inclusion.

internal characteristics of diversity are generally the most visible and unchangeable (although this is not always the case). These include age, sex (e.g., male, female), gender identities (cisgender, transgender, non-binary), race and ethnicity (e.g., African American, Hispanic/Asian, Pacific Islander, Native American), sexual orientation (e.g., lesbian, gay, bisexual, etc.), and mental and physical abilities. Primary characteristics are used to categorize ourselves and others in society. Secondary or external characteristics are somewhat more changeable, including but not limited to educational attainment, income, work experience, language, religion, and geographic location. Equity is achieved when both diverse members of the healthcare team and diverse patients are provided with the resources they need to enjoy full, healthy lives.[12] This is achieved by addressing the root causes of systemic inequities and promoting justice and

fairness within the processes, procedures, and distribution of resources. These actions also contribute to building inclusion, which is characterized by a sense of belonging among members of the healthcare team and/or patients who represent diverse backgrounds. Creating a sense of belonging involves the active involvement of all members of the healthcare team to develop cultural self-awareness and humility, and to advocate for inclusive and equitable programs and services within the health system. These elements of DEI culminate in justice, which refers to the dismantling of structural barriers to resources and establishing equitable access to tools and opportunities for all individuals and communities to thrive.[13]

THEORETICAL LINKS

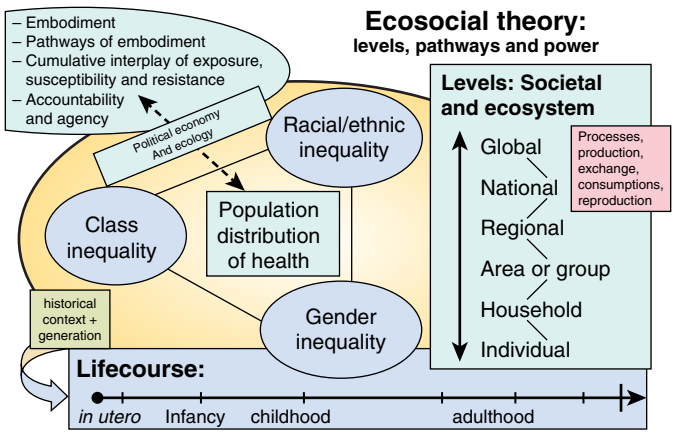
Theories that underpin DEI are those that seek to explain, provide a better understanding, or make sense of what we see day to day in clinical practice, such as disproportionate rates of disease and death in the most marginalized populations. Multilevel theories can broadly guide our DEI commitments as they rely on a greater understanding of the social, historical, and systemic context of health, as can be applied and translated into practice using the social–ecological model (*Concept 49: Health Disparities and Health Equity*). Additionally, many multilevel theories consider the distribution of health and disease rather than focusing solely on individual behavior or responsibility for maintaining health. These broad theories can inform and merge with more application-focused theories to guide patient-centered, culturally focused care in the community and at the bedside.

Ecosocial Theory

Nancy Krieger developed the Ecosocial Theory of Disease Distribution[14] in 2011 from the lens of a social epidemiologist (Fig. 43.3). This broad, multilevel theory was developed to study how racial discrimination and societal injustice harms health.[15] The central focus is related to unpacking how, who, and what drive social inequalities in health. The initial theoretical approach was focused on race and racism but has since been expanded to include any group that faces structural injustice leading to embodied harm.[16] By embodiment it is hypothesized that our physical bodies tell the stories of and biologically express discrimination and unjust distribution of power across both the life course (an individual's life from birth to death) and the generations in the form of disease. Current research in epigenetics has reinforced this hypothesis and describes the molecular mechanisms by which adverse life exposures influence health, some of which can be inherited across generations.[17] Understanding the factors that influence health across and within the levels and pathways of the Ecosocial theory can inform our DEI work in the promotion of health equity and justice.

Transcultural Nursing Theory

Although the Ecosocial theory helps us unpack *why* we see health disparities and inequities, Leininger's Transcultural Nursing theory gives nurses foundational tools and the 'how' to develop a plan of care and focuses on developing lifelong skills in cultural humility, while assessing and reflecting upon



Note. To explain current and changing population distributions of disease, including health inequities, and who and what is accountable for the societal patterning of health, it is necessary to consider causal pathways operating at multiple levels and spatiotemporal scales, in historical context and as shaped by the societal power relations, material conditions, and social and biological processes inherent in the political economy and ecology of the populations being analyzed. The embodied consequences of societal and ecologic context are what manifest as population distributions of and inequities in health, disease, and well-being.

Fig. 43.3 Ecosocial Theory. (Source: Krieger N. *Epidemiology and the people's health: Theory and context*. New York, NY: Oxford University Press; 2011.)

the complexity surrounding a community and/or patient's cultural identities.[18] This theory was developed in the 1950s but was more widely disseminated in the 1990s and was the first to not only focus on understanding the identities and culture of the patient to deliver safe and effective patient-centered care, but also theorize that the nurse's own culture, when different from that of the patient, can negatively influence care. Part of the assessment framework associated with this theory includes a nurse self-evaluation of how their own identities and cultural background may bias or change care when they differed from those of the patient.[19] Leininger's work opened the door for further self-reflection and inquiry in healthcare bias (unconscious and conscious) and how the incongruence of privilege and power based on our identities and culture may influence care (see *Concept 4: Culture* for more details about Leininger's Transcultural Nursing theory).

CORE COMPETENCIES

Diversity, Equity, and Inclusion

- Identify and examine your own personal biases, stereotypes, assumptions, and prejudices and consider how cultural differences might affect how you interact with healthcare staff and patients from diverse backgrounds.
- Assess and understand the historical underpinnings of race and racism in the United States and how it disproportionately affects racial/ethnic and sexual/gender minorities and other underrepresented and marginalized groups.
- Develop cultural self-awareness by completing equity training (e.g., unconscious bias, implicit bias, or antiracist training) and maintaining curiosity in learning about and engaging with other cultures.
- Demonstrate personal engagement by serving on DEI committees or councils within the healthcare system and/or in the surrounding community.
- Evaluate healthcare system policies and procedures for bias and revise them to reflect cultures, customs, behaviors, and information needs of diverse patients and healthcare workers.
- Advocate for equal distribution of resources to help mitigate/address inequities in disease burden for underserved populations at organizational, community, and policy levels.

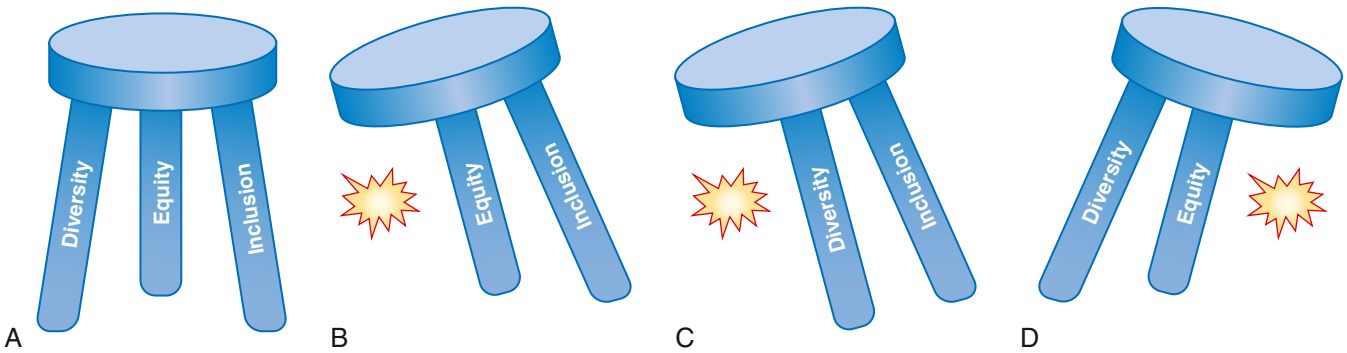


Fig. 43.4 Diversity, Equity, and Inclusion as a Three-Legged Stool. (A) All DEI concepts present and provide stability; (B) Equity and Inclusion without Diversity; (C) Diversity and Inclusion without Equity; (D) Diversity and Equity without Inclusion.

CONTEXT TO NURSING AND HEALTH CARE

Nurses are expected to demonstrate competence (the application of knowledge, skills, and attitudes) in all aspects of generalist nursing practice to provide safe and effective care. The Core Competencies Box presents behaviors consistent with cultural competency and/or humility to promote DEI. Competencies related to DEI are commonly associated with cultural competency. However, it can be argued that a culture is not something that one can become competent in, but rather that it is an ongoing aspirational process of self-awareness, learning, reflecting, and redressing injustices. Cultural humility is more commonly recognized and used to address issues of DEI especially in healthcare settings. Cultural humility is identified as "a commitment to lifelong learning & critical self-reflection, challenging power imbalances, and holding institutions accountable for and to the communities of color which they purport to serve."[20] The broad components of cultural competency are discussed in *Concept 4: Culture*.

A healthcare organization that embodies DEI would have a varied representation of individuals from diverse backgrounds or who hold diverse perspectives, with equal access to opportunities, and feel a sense of belonging with their peers, leadership, and within the organization. Certain key elements need to be in place for individual and organizational commitment to DEI to be reflected. In this section, we will first look at three scenarios in which the intersection of the key concepts of DEI are not achieved as a result of lack of commitment from individuals and organizations; we will then discuss the elements that need to be in place for DEI to be present.

Recognizing Imbalance in Organizational and/or Individual Commitment

A three-legged stool is a useful analogy to illustrate the need for all three DEI concepts to be present for optimal effectiveness and stability (Fig. 43.4A). An imbalance between the key concepts can result from organizational or individual factors.

Equity and Inclusion, but No Diversity

An example of equity and inclusion without diversity (Fig. 43.4B) is a healthcare organization composed of and led by one majority group. Everyone in the leadership group is given equal opportunities to share their perspectives, feel a sense of belonging, and contribute to making major decisions at the organization. As a result, policies that are made continue to benefit and serve those in power and those who look like those in power. As a result of the lack of diversity in leadership, no new perspectives are recognized or factored into the decision-making process. This results in a healthcare organization that does not fit the needs of its healthcare staff or patients from diverse backgrounds. Healthcare staff may end up seeking jobs elsewhere where they feel their voices are heard and appreciated. Patients may seek help elsewhere at organizations with nurses and providers who they feel both represent and understand their diverse backgrounds and needs, or they may choose not to seek help at all because of healthcare access limitations, leading to poor health outcomes.

Inclusion and Diversity, but No Equity

An example of inclusion and diversity without equity (Fig. 43.4C) is a progressive healthcare organization that represents a diverse group of healthcare staff whose voices are heard and factored into basic decision-making processes. The organization is also reflective of the diverse patient communities that it serves. However, individuals representing diverse groups are denied opportunities to serve in leadership positions, are not invited to key training opportunities for leadership, or mentored to become leaders. Because those in positions of leadership do not represent the diverse patient community, policies and major decisions may once again fail to represent the needs of these patients, which could affect access to care. This may also result in diverse healthcare staff seeking alternative employment at organizations that value their diverse perspectives and where there are no preconceived notions or restrictions on who can serve in leadership roles.

Equity and Diversity, but No Inclusion

Keeping in mind that inclusion is measured by an individual's sense of belonging, an example of equity and diversity without inclusion is a healthcare organization that is diverse and provides equal opportunities for individuals of diverse backgrounds to take on leadership positions and contribute to the decision-making process (Fig. 43.4D). However, when individuals are invited to share their opinions, they feel as though their perspectives do not resonate with or are misunderstood by the larger group or dominant culture. Although individuals from

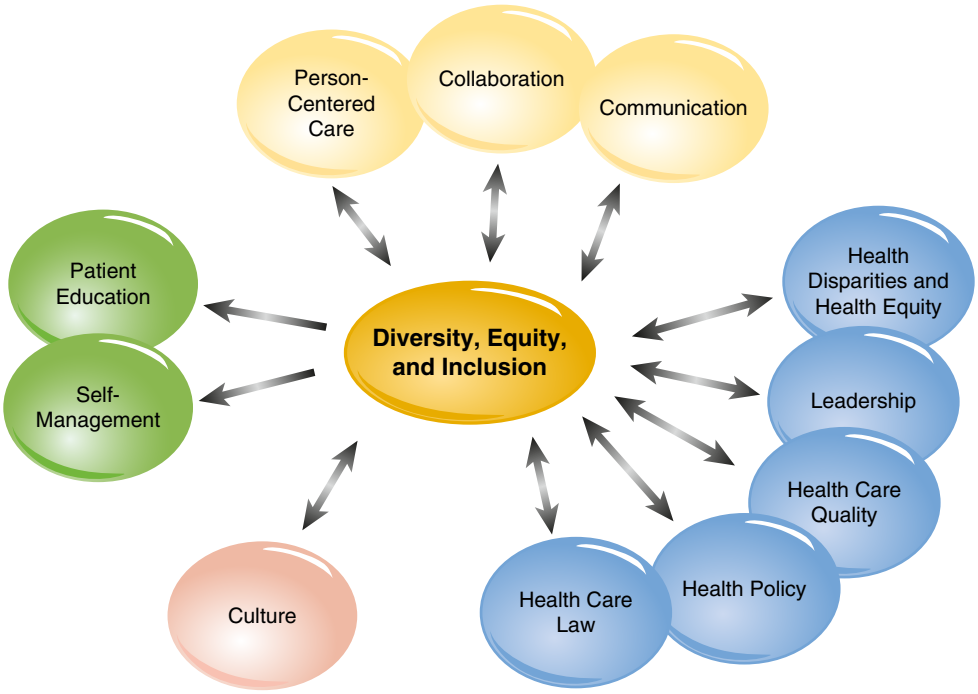


Fig. 43.5 Diversity, Equity, and Inclusion and Interrelated Concepts.

diverse backgrounds were given an equal opportunity to serve in leadership positions and share their perspectives, these perspectives are not valued or incorporated in the decision-making process. Healthcare staff may prefer to work in organizations where their individual perspectives are understood, respected, and valued. Similarly, patients from diverse backgrounds who may have been asked to serve on patient advisory boards or in other consulting capacities may feel discouraged to participate as they feel their opinions are not valued or incorporated in designing programs and policies.

Individual and Organizational Solutions to Address Diversity, Equity, and Inclusion

Solutions to address imbalances or lack of intersection of DEI concepts lie within individual and organizational commitment and action. Starting with a clear 3- to 5-year organizational strategic plan developed by and with individuals within and outside the organization (i.e., DEI council or patient advisory board) is an essential first step. Equitable participation of individuals within an organization will help assure that policies and programs address the needs of diverse groups. Recruitment and retention of nurses, other staff, and administrators from underrepresented and marginalized groups, including racial, ethnic, sexual, and gender minorities are necessary to support workforce diversity. Representation is key to building inclusive environments that foster professional and personal development and growth. Organizations have a responsibility to offer equal opportunities to all individuals for professional growth and development via mentoring programs, pipeline initiatives, and continuing education and training.

Individuals have a responsibility to engage in training and professional development activities (i.e., unconscious/implicit bias or antiracism training) that help promote cultural humility and cultural competence. When we empower individuals with the knowledge and skills to understand their roles in promoting equity and justice via training, they will be more likely to participate in civic engagement and advocate for policies that address systemic health inequities and injustices. All of these organizational and individual actions help create and foster an inclusive environment and contribute to a sense of belonging. This, in turn, has positive influences on quality of care for patients, innovative thinking and communication between healthcare staff, and financial performance/outcomes for organizations.[21]

INTERRELATED CONCEPTS

The concept cluster of DEI can affect every other concept in health and healthcare, but some effects are more discreet, structural, or unconscious, whereas others are more tangible and apparent. Concepts interrelated with DEI are presented in Fig. 43.5. The social–ecological model (*Concept 49: Health Disparities and Health Equity)* is used to differentiate the levels (individual, interpersonal, organizational/community) at which concepts primarily occur and provides a guide to assessing and/or intervening at each level.

Individual level (green). When DEI is prioritized **Patient Education** is focused on meeting the person where they are, in terms of literacy, numeracy, language preferences, and other identities. Likewise, raising awareness about historical and current health inequities can guide the nurse to individualize disease **Self-Management** and reduce barriers to care.

Interpersonal level (yellow). Relationships built on trust and empathy lead to **Person-Centered Care** and **Collaboration** between patients and provider, and members of the healthcare team. These are better developed when organizations and

communities intentionally focus on and invest in DEI. Affirming and inclusive styles of **Communication** is vital to how DEI content and engagement is delivered.

Organizational/community level (blue). Improving outcomes of populations who experience **Health Disparities and Health Equity** are at the core of DEI work. DEI informed **Health Care Law** and **Health Policy** are needed to anticipate and react to underlying causes of injustice. Strong **Leadership**, both in healthcare organizations and communities, is essential to championing DEI concepts. **Health Care Quality** will improve when DEI investments are made in the form of greater retention, more representative.

All levels (coral). **Culture** can be an individual attribute of an individual patient or healthcare team member, organization, and/or community. It can also be used more broadly to describe the bidirectional relationships or processes that occur in the workplace. DEI investments in training in cultural humility translate into improved health at all levels.

CLINICAL EXEMPLARS

There are several exemplars of DEI in the context of healthcare and nursing practice. These exemplars often intersect/overlap under each individual concept of DEI. Common exemplars are presented in Box 43.1 and a few of these are also discussed. Specific information about each of the exemplars is found in a variety of books, journal articles, and reputable websites.

BOX 43.1 EXEMPLARS OF DIVERSITY, EQUITY, AND INCLUSION

- Advocacy
- Antiracism
- Civility
- Civic engagement
- Culture
- Cultural diversity
- Cultural humility
- Cultural competence
- Equitable participation
- Equal opportunities
- Disrupting microaggressions
- Fairness
- Health equity
- Inclusivity of BILPOC (Black, Indigenous, Latinx, and people of color)
- Inclusivity of LGBTQ+ (Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, Plus)
- Sense of belonging
- Social and racial justice
- Multiculturalism
- Transcultural nursing
- Empowerment
- POC (people/person of color)
- Racial or gender parity
- Representation
- Workforce diversity

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Featured Exemplars

Health Equity

Health equity is achieved when "when everyone has the opportunity to be as healthy as possible."[12] The first step to achieving health equity is to identify and address the social determinants of health that create systemic, unjust, and avoidable disparities in access to care and health outcomes.[22] Acknowledging and addressing the social, economic, and historical factors that determine health has the potential to reduce health disparities and achieve health equity. Nurses play a pivotal role in shedding light on health inequities, advocating for policies, and leading programs designed to promote health equity and justice.

Civic Engagement

A diverse, equitable, and inclusive nursing workforce would be better prepared to advocate with and for others via civic engagement.[7] Civic engagement refers to "individual and collective actions designed to identify and address issues of public concern"[23] and includes engaging with community leaders to advocate for the safety and well-being of marginalized populations, as well as communicating with institutional, state, and/or federal policymakers in support of health equity policies. Nurses are central in leading and engaging in individual and collective advocacy efforts in the community to address health inequities that affect their patient populations and their practice.

Antiracism

Much like civic engagement, antiracism involves the active identification and opposition of racism in our society. Racism results in conditions that unfairly advantage some and disadvantage others in society and come in the form of individual, interpersonal, institutional, and structural racism. Racism is a public health crisis[24–26] and addressing racism is a core responsibility of nurses.[6] Being antiracist places a responsibility on nurses to confront racism and racial injustices within healthcare organizations and in the community. This can be accomplished through civic engagement in activities that help change behaviors, beliefs, and policies that perpetuate racist ideas and actions.

Workforce Diversity

The diversity of the healthcare workforce is a quality improvement metric as the lack of workforce diversity could have detrimental effects on patient access to care, health outcomes, and trust and on healthcare staff workplace satisfaction and job retention.[11] A diverse workforce helps generate a multiplicity of creative solutions to problems that we are facing in the healthcare system and is a key component to providing culturally competent patient care and supporting DEI initiatives. An increased focus has been placed on recruiting and retaining underrepresented groups in nursing to help enhance diversity in the nursing workforce.[27]

Addressing Microaggressions

Microaggressions are defined as "*the everyday verbal, nonverbal and environmental slights, snubs or insults, whether intentional or*

unintentional, that communicate hostile, derogatory, or negative messages to a target person based solely upon their marginalized group membership."[28] Microaggressions affect self-esteem, sense of belonging, and job performance. The accumulation of microaggressions has been linked to depression, traumatic stress, and heart attacks.[29,30] Nurses must be skilled in addressing microaggressions within healthcare organizations and in communities through the practice of cultural humility, which will help increase awareness, education, and understanding around the use and effects of microaggressions.

CASE STUDY

Case Presentation

Malcolm is a new nurse who graduated from his nursing program just 2 months ago. He is enrolled in the new graduate orientation program at the hospital where he works. During the shift change, Malcolm receives reports on three patients from a more experienced nurse, Anna Kate. Both Malcolm and Anna Kate are White, cis-gendered, and heterosexual. All nurses (including Malcolm and Anna Kate) have recently attended unconscious bias training as part of an organizational-wide initiative to promote DEI. Below are the reports Malcolm receives from Anna Kate.

Patient 1 Report: "Mr. Lopez...umm he has another last name, like, they all do- but he is the diabetic in Room 211. Hispanic male. 52 years old. He is back again for DKA. He is not taking his insulin at home-again. He is stable and will need to be discharged when the orders are written; I already gave him written discharge instructions. He said he could mostly read them in English, but I am sure we will see him again soon."

Patient 2 Report: "A person named Riley Richmond is in Room 212, 43-year-old. The ID bracelet says Betty Richmond, but she prefers Riley. There isn't anywhere to put that into the EMR, there was some mix up earlier about her name. He had breast reduction- "top" surgery, postop day 2, and had fever and drainage issues so he was readmitted overnight for IV antibiotics. I'm not sure why the medications haven't come up from Pharmacy yet."

Patient 3 Report: "Room 213 is Mrs. Davis, uncontrolled hypertension, African American female. 64 years old. All other vital signs are within normal limits. She reports vague pain in both arms, but she couldn't describe where, so we aren't treating it, going to wait and see if it is real pain."

Malcolm does not feel comfortable with the way the reports were given, and he wants to confront Anna Kate; however, because he is a new nurse, he feels uncomfortable doing so. Malcolm decides to reach out to his preceptor to discuss the situation and get advice regarding what to do.

Case Analysis Questions

1. What do you notice in each of these reports that reflects Anna Kate's biases, assumptions, and stereotypes?
2. How can Malcolm confront these issues with his colleague?
3. How can this unprofessional behavior cause harm or negatively affect the health of each patient?
4. How do both nurses' identities possibly play a role in their ability to confront and discuss their own and each other's biases? (If one nurse had been a person of color or from a minority gender or sexual identity, would this conversation be different or harder to initiate, and why or why not?)

DKA, diabetic ketoacidosis; *EMR*, electronic medical record.

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 44

Communication

Jennie C. De Gagne

Communication is an essential form of human behavior; it is so fundamental to human social systems that our world would barely be recognizable without it. The importance of our ability to engage with the world through communication cannot be overestimated. Communication is unavoidable within the context of social life[1] because human social interaction is accomplished through the development of relationships that are mediated by communication. From intimate family relationships to distant or formal professional relationships, interactive communication and the exchange of information between participants allow the creation and coordination of social processes, the integration of disparate individuals into social groups, and the formation of social contacts. Communication is an essential process that allows humans to create and maintain family, organizational, cultural, national, and global bonds.

DEFINITION

The multiple definitions of communication in the literature vary only slightly. A synthesized definition would need to include the use of shared symbols to convey meaning. Because there is no known way to communicate directly with others telepathically, people must use symbols[2] (e.g., written, dramatic, numeric, artistic, musical) to transmit messages.[3] Symbolic interactions between people can be used to express moods and feelings or transmit ideas. For the purpose of this concept presentation, communication is defined as *a process of interaction between people in which symbols are used to create, exchange, and interpret messages about ideas, emotions, and states of mind.*

SCOPE

The concept of communication encompasses all means by which people exchange messages with one another, ranging in scope from effective to ineffective and including no communication (which can also convey meaning). Forms of communication include verbal, nonverbal, symbolic, and metacommunication (Fig. 44.1). Verbal language includes the conveyance of meaning through a collection of spoken and/or written words. Vocabulary and intonation are components of verbal communication. Nonverbal communication includes all communication that is not spoken or written. This form of communication is powerful and often complex and can include eye contact, use of personal space, and facial expressions. Symbolic communication involves incorporating art and music to enhance meaning.[4] Metacommunication consists of the factors that comprise the context of the message. Because the ultimate goal of communication is to create meaning, the particular context or situation in which a communication occurs can have an effect on the meaning derived from the message.[4] Metacommunication factors that affect how messages are received and interpreted include internal personal states (e.g., disturbances in mood), environmental stimuli related to the setting of the communication, and contextual variables (e.g., the relationship between the people in the communication episode).

ATTRIBUTES AND CRITERIA

Although the simplest definition of communication is the transmission of ideas between people, the concept of communication is extremely complex and has been studied in depth by academics and professionals in numerous highly specialized fields (e.g., interpersonal communication, organizational communication, visual communication). In the nursing sciences, three attributes of communication form the basis of study: the process of complementary exchange, context, and learned skill.[4]

Process of Complementary Exchange

The process of complementary exchange occurs between participants who either send or receive messages, often in turn. The reception and transmission of messages between participants can be dynamic, cyclic, reciprocal, and interactive, with the dialogue serving to support the creation of shared meaning. The sender encodes a message using verbal and/or nonverbal symbols and transmits the created message to the receiver. When the transmission is completed, the receiver perceives the message, interprets the symbols, and responds to the sender with a similar act of encoding and transmission. There is an understanding between participants that they are creating and negotiating meaning during the exchange as they perceive, decode,

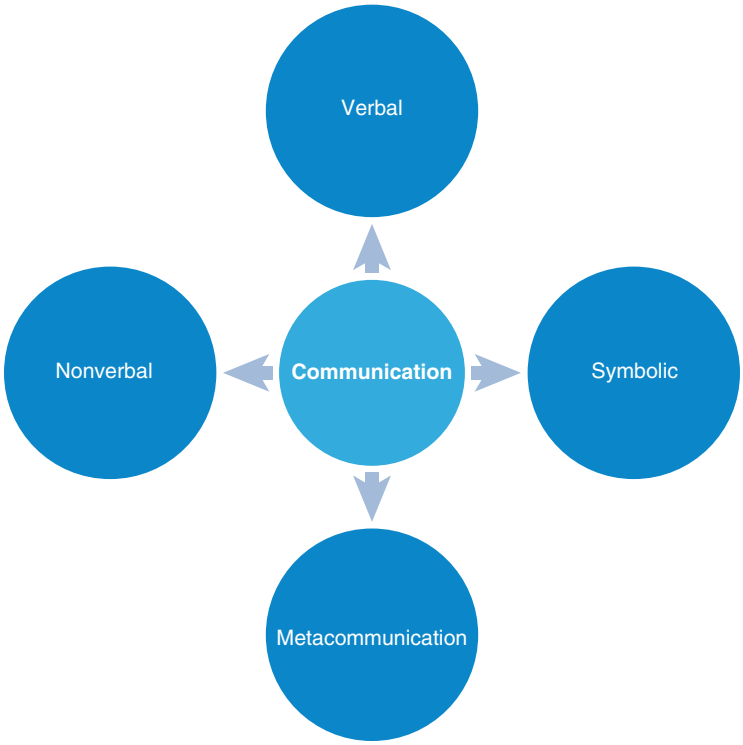

Fig. 44.1 Forms of Communication.

and interpret one another's messages.[5] Because meaning results from negotiation, effective communication depends on mutual engagement and on the authenticity of each participant's contributions during an exchange. The equal burden of negotiating shared meaning explains why messages and responses between nurses and patients can be subject to distortion or misinterpretation if the patient is ill, anxious, or distracted by pain and why such communications can be misread or negatively perceived.[6]

Context

Metacommunication refers to the quality of meaning derived by participants during the process of complementary exchange. Contextual factors are characteristics of the environment in which the communication occurs that affect participants' perception and interpretation of messages. Context can include environmental factors, such as external noise, participants' relationships, internal mood states, mental and physical condition, and experience and education.

Communication is both subject to and a reflection of relationships, whether they be distant or intimate. Relational roles can affect the communication process in several ways: Symmetric roles can yield equal relationships; complementary relationships (in which one participant has a higher position or more important role than another) involve status and power inequities that can affect the communication. For example, a child might fear that providing certain types of information could elicit negative responses from their parents.[3,4]

Learned Skill

Communication is a learned skill that develops over time through interactions with others, and it includes the complexity of a person's genetics and culture.[2] Becoming an expert communicator requires gaining a thorough knowledge of the communication process and engaging in thoughtful reflection on former communication experiences.[3] A full awareness of the factors that influence communication at any point facilitates understanding of the message being communicated. Nursing students should be aware that cognitive, behavioral, and cultural factors can influence communication. They must be competent users of medical terminology in order to communicate with other healthcare professionals. A nurse should also be aware of the effect that intrapersonal communication, often called self-talk, can have on their attitudes about and perceptions of the nursing care they provide.[4,5]

THEORETICAL LINKS

The most basic theory of communication is described by a linear process model in which a *sender* transmits a *message* to a *receiver* (Fig. 44.2).[1] This process begins when the sender encodes a message (verbally or nonverbally) and sends it to the receiver through a medium such as voice or print. Upon perceiving the message, the receiver decodes and interprets the message, creating meaning from the symbols.

This representation fails to convey the true richness of the communication exchange as a means of creating shared meaning among participants. As noted previously, many factors affect the perception and interpretation of messages. A model that does not reflect the iterative complexity of communication exchanges in which messages are passed back and forth between participants is too simplistic.[3] Communication episodes involve multiple acts of perception and interpretation to create a mutually negotiated meaning. A more accurate representation

Fig. 44.2 Basic Communication Theory.

requires a complex model of the communication process (Fig. 44.3) depicting the influences of multiple factors on the meaning, created as participants interact.

Effective communication between patients and healthcare professionals is an active, two-way exchange process of clear, concise, accurate, concrete, courteous, complete, timely, and usable information. The negotiation of shared meaning in the encounter is impaired if the purpose of the communication is unclear or the symbols used for expression of the message are inappropriate.[7] A poorly worded email whose meaning is questionable can create confusion and spread misinformation among members of a workgroup. A course syllabus that fails to provide clear direction or that contains incomplete information or errors will result in student uncertainty. The colloquialisms common to any nonnative language can be inexplicable and sources of error and embarrassment. In such situations, clarity and the goals of the transmitted message can be lost, and its ultimate meaning can be distorted.

CORE COMPETENCIES

Communication

- Promote timely, effective, and appropriate communication among healthcare team members.
- Assess communication ability, health literacy, and communication preferences of patients and families.
- Acknowledge differences in communication style and preferences among patients and families.
- Implement a variety of methods and techniques to ensure that information and knowledge communicated to patients, families, and communities is respectful and understandable.
- Identify personal learning and professional growth opportunities related to communication skills.

CONTEXT TO NURSING AND HEALTH CARE

Health care is a critical social activity established for the purpose of helping people address their health concerns. It encompasses a variety of social structures that reflect the myriad of specialized relationships necessary to support the delivery of healthcare services. Nurses can expect to engage in multiple acts of communication daily in their work environments, perhaps more so than in their personal lives. For nurses, effective communication is a professional imperative. Their professional role requires nurses to develop and practice communication skills that ensure successful role function and the delivery of high-quality patient care. Because health care is relationship-based, communication competence with patients and other members of the healthcare services environment is a highly valued asset for nurses. In the healthcare environment, effective communication is essential for interactions involving patient safety and healthcare quality, the electronic health record, and advocacy.[5]

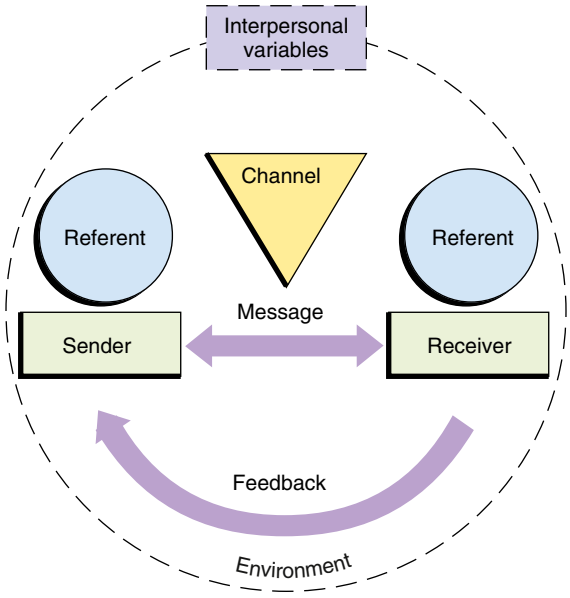

Fig. 44.3 Elements of the Communication Cycle. (From Potter, P.A., Perry, A.G., Stockert, P., & Hall, A. [2019]. *Essentials for nursing practice* [9th ed.]. St. Louis: Elsevier.)

Communication Competence

Communication competence in nursing requires that communication be both *effective* and *appropriate*. Effectiveness is achieved when the goals of the communication are met. Appropriateness is achieved if the communication is well adapted to the people and situations it involves.[1] Communication competence has been identified as one of the core concepts of the AACN Essentials[8] and the IPEC core competencies. [9] Communication is also a competency within the QSEN's teamwork and collaboration[10] and the ANA Standards of Nursing Practice.[11] Because communication is a learned skill, training in effective communication begins early in nursing education compared with other behaviors and attitudes that produce the framework for nursing competence, and communication continues to evolve with experience and professional development. Professional nurses can expect to engage in skilled interpersonal communications both as caregivers and as members of the healthcare profession. As a caregiver, nurses must communicate effectively and appropriately with patients, families, and members of the healthcare team. As members of the profession, nurses are expected to voice the concerns of patients, families, and communities competently to others within the profession and the larger health services sector. By achieving communication competence, nurses can optimize safety and quality in health care and establish an authoritative voice to advocate for better systems and safer workplaces.

Patient Safety and Healthcare Quality

The Institute of Medicine (IOM) captured national attention in 2001 with a report titled *To Err Is Human: Building a Safer Health Care System*.[12] In this report, the IOM noted that an estimated 98,000 medical errors each year caused unnecessary injury or death for patients in the U.S. healthcare system. IOM reports have continued to produce critical evaluations of safety and quality problems inherent in healthcare systems with a particular focus on the related actions of healthcare professionals, including nurses.[13,14] Communication is frequently cited as a cause of errors in healthcare delivery and a leading cause of *sentinel events,* defined as *unusually serious, unexpected events that occur during episodes of care*. Sentinel events such as patient suicide, wrong-site surgery, medication error, or patient falls not only result in harm to the patient but lead to increased healthcare costs. Consequently, communication competence has become a critical skill to promote quality of care and patient safety.[15]

The IOM recommends training health professionals to use practices and tools that support effective communication. One such tool for consistent and accurate communication between professionals is the Situation, Background, Assessment, and Recommendation (SBAR) communication technique (Table 44.1), which provides a framework for communication between members of the healthcare team. This easy-to-remember, concrete cue can be helpful in any type of communication, especially when the patient's situation is critical and requires immediate attention and action. All healthcare professionals can employ this method in order to develop a better culture of teamwork and patient safety.[16]

Electronic Health Record

Another fundamental communication skill that nurses must master is accurate and timely documentation in the patient record. Most inpatient settings now use an electronic health record (EHR), which enhances the potential for improved communication among healthcare providers in a variety of settings. A digital record of a person's health history can facilitate the timely transmission of complete and accurate information between providers; for example, the EHR allows emergency personnel to access prior medical history and conditions for patients who are critically ill or seriously injured. However, the speed of digital transmission and potential for widespread dissemination of electronic records raise concerns related to accuracy and confidentiality. Because multiple providers access EHRs to make healthcare decisions, documentation errors, omissions, or inaccurate or faulty information can jeopardize patient safety and care. Nurses working with an EHR must be cognizant of these potential threats to the quality of care and patient safety.

TABLE 44.1 SBAR Communication Tool

Element	Description
Situation	What is happening at the current time?
Background	What are the circumstances leading up to this situation?
Assessment	What does the nurse think the problem is?
Recommendation	What should we do to correct the problem?

SBAR, Situation, background, assessment, and recommendation. From Institute for Healthcare Improvement. (2022). *SBAR tool: Situation-background-assessment-recommendation.* Retrieved from http://www.ihi.org/resources/Pages/Tools/SBARToolkit.aspx.

Advocacy

Nurses must possess communication competence to function effectively in the role of advocate. Advocacy is the act of speaking for others in order to assist them and meet their needs, and it is expected of all who assume the role of professional nurse. Advocacy might involve interceding with members of the healthcare team on behalf of patients or families, within systems on behalf of members of the healthcare team, or in national or international forums on behalf of the profession. The ability to voice one's ideas and thoughts assertively, credibly, and confidently is a highly valued communication skill critical to effective advocacy. Principles of assertive communication are routinely taught in basic nursing education courses with continued refinement of the skill encouraged throughout professional development and graduate education.[4,5]

INTERRELATED CONCEPTS

Communication involves an exchange of information between participants which leads to a negotiated, mutual understanding of a situation or phenomenon. As such, communication is closely associated with several related concepts: Collaboration, Care Coordination, Person-Centered Care, Culture, DEI (Diversity, Equity, and Inclusion), Safety, and Health Care Quality (Fig. 44.4).

Communication is the structure that supports social interaction and the primary means of both **Collaboration** and **Care Coordination**. Nurses collaborate with patients and families to develop a plan of care and with members of the healthcare team, often functioning as a link between the patient and the rest of the team. Nurses routinely coordinate care to ensure that it is appropriately and safely delivered and beneficial to the patient. Effective collaboration and care coordination are essential to **Person-Centered Care** and patient safety, so nurses must be skilled in these competencies. Errors, omissions, and gaps in communication between the patient and the healthcare team or among the members of the healthcare team can lead to dangerous and costly errors in care.[4] It is, therefore, crucial that nurses ensure that communication is clear, accurate, and timely.

Culture and communication exist in a symbiotic relationship. Cultural development relies on an infrastructure of communications, especially the symbols used in language, attire, and patterns of behavior, which are expressions of culture. Behavioral expectations and norms, values and traditions, the building and maintenance of relationships, the definition of personal space dictated by cultural norms, and the significance of words and gestures are all dependent on the transmission through acts of communication of ideas, values, emotions, and needs. Communication around **DEI** (**Diversity, Equity, and Inclusion**) is critical, as its efforts allow healthcare organizations the opportunity for the representation and participation

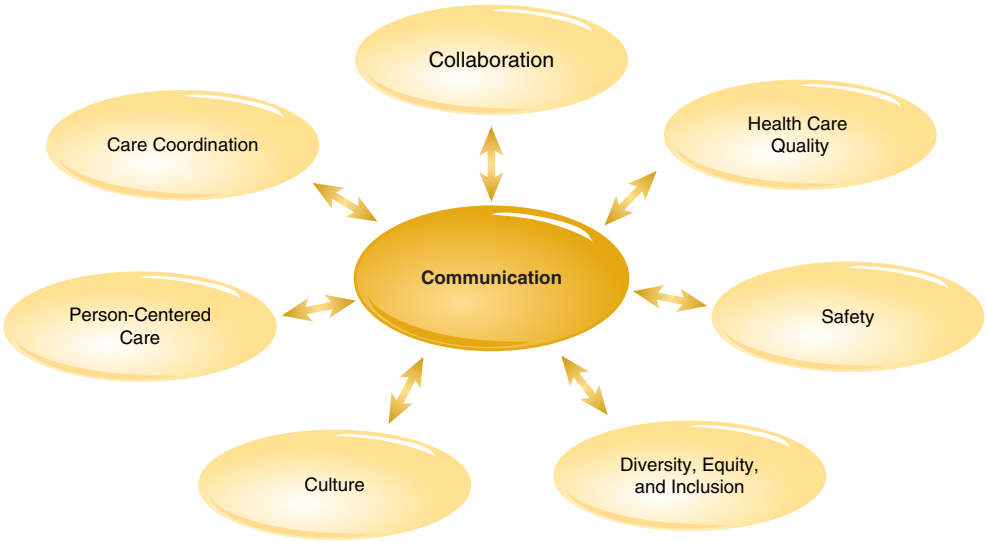

Fig. 44.4 Communication and Interrelated Concepts.

of diverse cultures of individuals. The relationship between culture and communication has important implications for nurses, whose profession can involve interactions with people from numerous cultures and encounters with various culturally based communication practices. Nurses need a fundamental awareness and appreciation of cultural differences in order to address proactively any potential misperceptions and misunderstandings that might arise during the implementation and evaluation of care. Communications within organizations are both affected by and help mold the prevailing organizational culture. This is particularly true for healthcare professions given the many links between communication, organizational culture, **Safety**, and **Health Care Quality**. Communication systems must support clear, timely, and accurate communications between healthcare professionals, unimpeded by contextual factors such as power and status. Effective communication is fundamental to safe systems and requires the adoption by healthcare organizations of communication strategies that ensure high quality care.[4]

CLINICAL EXEMPLARS

In the field of nursing, communication encompasses a wide range of practices that support effective interactions with others. These exemplars of communication represent situations within the context of professional nursing practice. A list of exemplars is presented in Box 44.1.

Featured Exemplars

Assertive Communication

Assertive communication refers to a process through which ideas and feelings are expressed openly and directly. Nurses can use assertive communication intentionally to advocate for their patients with other healthcare professionals. Many personal factors can influence a nurse's communication with others including culture, gender, personality type, and level of self-confidence. Assertive communication respects the rights of all participants while allowing the sender to use their voice successfully as an advocate.[4,5]

BOX 44.1 EXEMPLARS OF COMMUNICATION

- Assertive communication
- Therapeutic communication
- Intrapersonal communication (self-talk)
- Interpersonal communication
- Interprofessional communication
- Electronic health record documentation
- Handoff/reporting

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Therapeutic Communication

Therapeutic communication is a dynamic and interactive process in which clinicians and patients use words and actions to promote understanding, build relationships, and achieve identified healthcare outcomes.[17] This collaborative type of communication forms an important part of the healing process for patients and families.

Interpersonal Communication

Interpersonal communication describes the verbal and nonverbal interactions embedded in relationships among human beings, whether between two individuals or within groups. Interpersonal communication and subsequent relationships begin at birth, generally between the infant and its parent/s, and continue throughout the life span, satisfying the human need for connection with others. Many types of interpersonal relationships exist, including those between friends, family members, romantic partners, and, in nursing practice, between nurses and their patients.

Electronic Health Record Documentation

Skill in using the EHR is a requirement in today's healthcare environment. Not only must the patient's care and condition be documented adequately and thoroughly, but the nurse must be aware of the healthcare system's potential need to retrieve a complete and accurate record of nursing care and patient

condition. Most documentation systems incorporate a series of conventions and rules for use, and nurses must fully understand and meet expectations for appropriate documentation.

Handoff/Reporting

Nurses communicate with one another via end-of-shift or end-of-day reports, often called handoffs. This process of nurse-to-nurse communication entails the sharing of patient data between shifts and at other points of transition with the primary intent of ensuring accuracy and continuity of care. A common process for handoff reporting is the SBAR. Handoff and reporting are key components to effective communication and directly related to safety, healthcare quality, and patient outcomes.[5,16]

CASE STUDY

Source: monkeybusinessimages/iStock/Thinkstock.

Case Presentation

Jenna Reyes is a newly graduated nurse who is eagerly anticipating her first day of work. She has been hired as a nurse in the surgical intensive care unit (ICU) of a large hospital and selected for a 6-month residency program for new nurses offered by the hospital.

Jenna reports to her new nursing unit early on her first day. She waits at the nurses' station for her assigned preceptor, Dominic Thomas, who has 5 years of nursing practice experience. Dominic has been chosen by the unit manager to be Jenna's preceptor because of his superb communication skills and effective mentorship. Dominic is familiar with the "first-day jitters" common to new nurses, so he also arrives slightly early and meets Jenna at the nurses' station. Dominic walks directly to Jenna, smiles, and greets her:

"Hi, you must be Jenna. I'm Dominic, and I will be your preceptor during your residency. I have worked on this unit for the past 5 years and find I really enjoy the challenge of the surgical ICU." Jenna smiles shyly and nods her head. "I am so excited to be here. It's great to finally be starting out, no longer a student."

Dominic laughs and nods his head, "Oh yes, I know. Students are fun to have on the unit, but I also know there are limits to what they are allowed to do. Getting to spread your wings and learn this new role can be very exciting, and we want you to be excited. We want you here, and we are going to work really hard to get you oriented to the unit and help you get your 'feet on the ground.' We have a great team of nurses on this unit, and we expect a lot of each other. We want you to be a part of that team and to learn and grow in the position. After all, that helps all of us, right? So, let's find a place for your things, and then we will go to report. You know, I think there is another new nurse working in the medical ICU. Let's see if we can arrange to have lunch with her and her preceptor."

Case Analysis Questions

1. What are three attributes of effective communication noted in the case?
2. What is one verbal and one nonverbal communication example in the case?
3. What is the effect of culture in this case?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 45

Collaboration

Judy Liesveld

When thinking about the profession and practice of nursing, the words "collaboration" and "nursing" seem inseparable. Nurses work with patients, families, communities, and other professionals in a multitude of settings from state-of-the-art hospitals to remote rural home settings and clinics. Collaboration involves building models of health care using the best ideas of our patients and our partners in the healthcare setting. Understanding collaboration is perhaps the key component for reducing errors in patient care. Collaboration remains an unclear concept with varying meanings and perspectives among health professionals. Exploration of the concept of Collaboration will help crystallize its meaning and potential for advancing the nursing profession and improving the health outcomes of our patients.

DEFINITION

The word *collaborate* is derived from the Latin word *collabōrāre,* meaning "to labor together." Collaboration usually has the connotation of working with others in an intellectual endeavor. Nurses labor with patients, families, and healthcare workers such as physicians, pharmacists, social workers, physical therapists, medical assistants, and other lay health workers using knowledge, reasoning, and critical thinking skills to promote or restore health. For the purposes of this concept presentation, collaboration in nursing is the *development of partnerships to achieve best possible outcomes that reflect the particular needs of the patient, family, or community, requiring an understanding of what others have to offer.* Collaboration also involves a joint responsibility for patient outcomes.[1]

SCOPE

The scope of collaboration spans four overarching categories, each based on collaboration with the nurse: nurse–patient, nurse–nurse, interprofessional, and interorganizational (Fig. 45.1).

Nurse–Patient Collaboration

Nurses are inherent collaborators. The American Nurses Association (ANA) identifies six standards for nursing practice known as the nursing process: assessment, diagnosis, outcomes identification, planning, implementation, and evaluation.[2] Opportunity for nurse–patient collaboration exists at each level of the process. Nurses particularly collaborate with patients as fully functional members of the healthcare team in making healthcare decisions.[3] For example, nurses collaborate with patients regarding health promotion and disease prevention behaviors, treatment strategies and options, lifestyle changes, and end-of-life decision making.

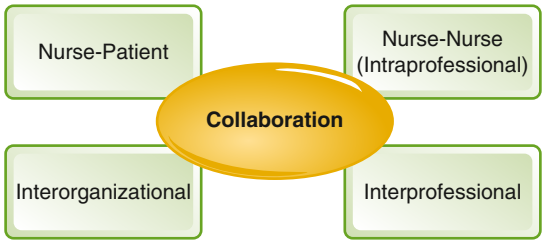

FIG. 45.1 Scope of Concept: Collaboration.

The historical context for nurse–patient collaboration is rich and extensive. Florence Nightingale encouraged collaboration with the patient, assessing what is needed or wanted.[4] In an early use of nurse–patient collaboration, Hildegard Peplau described a component of the working phase of her nursing theory as the patient participating with and being interdependent with the nurse.[5] Also, in her human-to-human relationship model of nursing, Joyce Travelbee defined nursing as an interpersonal process whereby the nurse assists an individual, family, or community to prevent or cope with the experience of illness and suffering and, if needed, to find meaning in these experiences.[6] Throughout the years, many other nurse theorists have examined and defined the nurse–patient relationship with elements of nurse–patient collaboration existing in many of the theories.

Nurse–Nurse Collaboration

Nurse–nurse collaboration, or intraprofessional collaboration, is also important to consider. How do nurses collaborate together? Nurses develop nursing teams in hospital units, clinics, and community settings that provide collaboration and support in patient caregiving. Nurses from various specialty areas

also collaborate: nurse managers, nurse researchers, nurse educators, advanced practice nurses, as well as novice nurses with expert nurses.[7]

Mentoring

Mentoring is a special type of collaboration, or creative partnership, typically between a novice nurse and an expert nurse, that has been recognized as beneficial to the development of professional nurses.[8] Mentoring is described as purposeful activities that facilitate the career development, personal growth, caring, empowerment, and nurturance that are important to nursing practice and leadership.[9] The purpose of mentoring is to enable a smooth transition from a novice nurse to a knowledgeable practitioner who is self-reflective, self-confident, and able to negotiate both professional and patient relationships.[9] Despite the valuable benefits of mentoring, challenges to successful and constructive mentorships exist. Ketola stated that mentoring needs to go beyond the acquisition of knowledge and skills and include the socialization of a nurse transmitting the values, norms, and accepted modes of behavior for the professional nurse.[10] Jakubik also encouraged mentoring to progress from the traditional approach of fostering support, competency, and job retention to a more modern approach of promoting career development and advancement, similar to mentoring in the business world.[11]

Shared Governance

Shared governance, another type of collaboration found in nursing, is a model that fosters a decentralized style of management that creates an environment of empowerment.[12] Shared governance is seen as an important component of professional practice and pursuit of Magnet designation from the American Nurses Credentialing Center.[13] The goal of shared governance is to transition from a traditional hierarchical management style to one in which nursing staff are more involved in decision-making processes and managers are facilitative, rather than controlling.[14] Nurses practicing in a shared governance environment truly work together and collectively develop collaborative relationships. Collaborating in the shared governance model, nurses can help improve quality of care and clinical effectiveness, facilitate the development of knowledge and skills, increase professionalism and accountability,[15] and improve job satisfaction.[16] Shared decision making, the cornerstone of shared governance, is an essential element to improve the healthcare system of the future.[14]

Interprofessional Collaboration

The true essence of collaboration involves working across professional roles. With interprofessional collaboration (IPC), individual areas of expertise are represented along with diverse perspectives influenced by professional orientation, experience, age, gender, education, and socioeconomic status.[17] The goal of IPC is to form a partnership between a team of health providers and a patient in a participatory, collaborative, and coordinated approach to share in decision making of health and social issues.[17] The scope of IPC is vast and could include professionals from nursing, medicine, pharmacy, occupational therapy, physical therapy, dentistry, social work, education, law, or many others interacting with the patient and family. Collaboration among varied professions, at times, fosters inherent challenges such as imbalance of power and authority, confusion of roles and responsibilities, and tension with boundaries when delivering patient care.[18] Globally, health policymakers have recommended IPC as a primary approach to improve quality and safety in patient care. Anecdotally, nurses and other health professionals know that IPC improves patient outcomes as well as professional job satisfaction.

The COVID-19 pandemic fast-tracked healthcare organizations and agencies to collaborate from an individual to global level. Resources, best practices for treatment, policies, and research were shared. Teams of healthcare providers collaborated to save patients. Public health, community, and governmental agencies worked relentlessly to vaccinate and educate. In many communities, nurses were called upon to work in unfamiliar units. In one study, the key to maintaining quality and safety of care when nurses worked in unfamiliar units was collaboration.[19] A group of health professionals working in skilled care facilities during the pandemic used a collaborative framework consisting of three domains: (1) bridging gaps with acknowledgment of differences in beliefs, attitudes, and feelings; (2) negotiating overlaps involving role clarification; and (3) creating strategic spaces such as brief daily meetings, huddles, or shared rounding opportunities.[20] The framework could be a useful model in many collaborative settings.

A growing trend in professional healthcare curricula is to offer interprofessional courses as a means of facilitating mutual respect, understanding, and commitment to common goals; joint problem solving; mutual give and take; shared accountability; and collegial communication.[17] Many accrediting organizations, including the Commission on Collegiate Nursing Education, are incorporating interprofessional education (IPE) as a requirement for baccalaureate and graduate nursing programs.[21] Best practices to deliver IPE are being researched and developed. The general opinion in IPE is that students benefit from learning to collaborate in an academic setting before they are expected to practice together in a care delivery setting. Studies have shown positive changes in medical students' attitudes toward their nurse colleagues when introduced to the diverse roles on interprofessional teams. Pfaff and colleagues found that new graduate nurses were more confident in interprofessional collaboration if their unit educator and manager had close proximity and were easily accessible, if different healthcare disciplines were worked with daily, and if satisfaction with the team existed.[22] Again, the COVID-19 pandemic leveled the playing field for healthcare workers. No one had experience treating such a catastrophic public health emergency that caused all health professions to collaborate for the best patient care.[23]

Many undergraduate nursing programs are combining interprofessional learning with simulation.[24] A recent integrative review of the literature of nine studies showed that the combination of interprofessional learning and simulation successfully increased collaboration and understanding of roles, improved communication, and enhanced learning among nursing students and other health professionals.[24]

Interorganizational Collaboration

Consideration of interorganizational collaboration is important in today's healthcare environment. Pooling of resources and information between organizations can benefit patients and communities at regional, national, or international levels as evidenced during the COVID-19 pandemic. Interorganizational collaboration often takes place in the form of coalitions or consortiums. For example, nurses have been involved in coalitions addressing healthcare disparities, diabetes prevention, teen pregnancy, immunization rates, and health care for the homeless. Healthcare consortiums often exist in communities or regions to ensure integrated care delivery, information, and networking among healthcare deliverers. Academic, practice, and industry settings are recently collaborating to share big data sets that can be used in research to improve precision in measuring quality, patient outcomes, and cost of nursing care.[25]

ATTRIBUTES AND CRITERIA

The Interprofessional Education Collaborative Expert Panel, a panel representing 15 different professional entities (including the nursing, social work, pharmacy, medical, osteopathic, public health, and dental professions), identified four competencies or attributes necessary for effective interprofessional collaboration.[1] These attributes are transferable to intraprofessional collaboration, and they represent the ingredients (attributes) needed for successful collaboration. They are (1) values/ethics, (2) roles/responsibilities, (3) communication, and (4) teamwork/team-based practice.

Values/Ethics

Values and ethics, undergirded with mutual respect and trust, are an important component in creating a professional and interprofessional identity. These values and ethics are embedded in patient-centeredness and strive for safer, more efficient, and more effective systems of care. Demonstration of interprofessional values would be evidenced by professionals working together and applying principles of altruism, excellence, caring, ethics, respect, communication, and accountability to achieve high-level health and wellness in individuals and communities.[1] The ethical principles considering health care as a right and balance in the distribution of resources are also important. Respect for diversity that is found in the individual expertise each profession contributes to care delivery is also considered.

Roles/Responsibilities

Collaboration requires an understanding of how professional roles and responsibilities support patient-centered care. Clearly articulating one's professional role and responsibilities to other professions and conversely understanding other professions' roles is a key element for effective collaboration. Recognizing legal boundaries and limits of professional expertise is also needed. Understanding that roles and responsibilities might change based on a specific care situation is important.

Communication

Communication has been described as a core aspect of collaborative practice. A common language for team communication that avoids professional jargon is considered a key to safe and effective communication. Dismantling professional hierarchies created by demographic and professional differences is also valued in interprofessional communication. All professions and team members are equally empowered to speak up in firm, respectful ways regarding patient care issues. Finally, consideration of health literacy and effective use of communication technologies are viewed as important components of interprofessional communication.

Teams and Teamwork

Learning to be a good team player is an important component of collaboration. Teamwork behaviors involve collaboration in the patient-centered delivery of care and also in coordinating care with other health professionals so that gaps, redundancies, and errors are avoided. Teamwork also involves shared accountability, shared problem solving, and shared decision making. The process of teamwork can occur in microsystems such as hospital units or with increasing complexity between organizations and communities. *The Future of Nursing 2020–2030: Charting a Path to Achieve Health Equity*[26] emphasizes the need for collaboration and teamwork to collectively reduce health inequity and to understand the social determinants of health affecting individuals and communities at all levels of health care. Nurses are encouraged to participate in disaster preparedness with interprofessional teamwork to prepare and mitigate poor outcomes for the most vulnerable and at-risk populations.

THEORETICAL LINKS

Theory of Collaborative Decision Making in Nursing Practice

Kim's theory of collaborative decision making in nursing practice offers a solid framework for the concept of Collaboration.[27,28] Kim developed her theory in the early 1980s, following society's renewed interest in human rights and demand for informed consent. Kim recognized that many different types of nursing care decisions are made for patients that influence their health in various ways and that patients have the resources required to be active participants in making healthcare decisions affecting the outcomes of nursing care.[26] Collaboration was defined as a process in which two or more individuals work together for the attainment of a goal—a process by which a joint influence on an action is produced. Kim's theoretical framework included the initial context of participants, both the patient and the nurse, and their accompanying role expectations and attitudes, knowledge, personal traits, and definitions of the situation. This initial context then influenced the context of the situation, including organizational components of decision making and the nursing care decision type, such as immediate- or long-term effects. Next, the primary outcomes of the decision-making process, the level of collaboration, and the nature of the decision were assessed. Kim stated that collaborative decision making could be assessed on a continuum in which the lowest level of collaboration is expressed as complete domination of decision making by the nurse and the highest level of collaboration is expressed as an equally influencing joint decision making.[26] Finally, the patient outcomes, the result of the primary outcomes, were

determined: goal attainment, feelings of autonomy and control, satisfaction, health status, and recovery.

Kim's model specifically addresses collaboration between the patient and the nurse but could extend to collaboration with other family members or health professionals at the context of participant level, such as patient, caregiver, and nurse. Kim proposed several research questions to develop a knowledge base for the theory of collaboration in nursing.[26] These questions continue to hold relevancy for collaboration with patients, nurses, and other health professionals. The following is a list of some of these questions:

- Are there opportunities for patients to collaborate in making nursing care decisions?
- Do nurses believe in the value of patients' collaboration in making nursing care decisions?
- What are the relationships between the patients' collaboration in making nursing care decisions and patient outcomes?
- What are the consequences to nurses of patients' collaborations in making nursing care decisions?

Interprofessional Education Collaborative Model

The Interprofessional Education Collaborative developed a model that incorporates the four attributes of collaboration as previously described.[1] The model was derived from social theories of learning and complexity theory.[29] These theories recognize the social and experiential nature of interprofessional collaboration and the complex healthcare environment in which it occurs. The attributes of communication, roles and responsibilities, values/ethics, and teamwork and team-based practice are equally distributed in a fluid circle surrounded by patient- and family-centered care (Fig. 45.2). A final outer layer including the importance of community- and population-oriented care is included. A straight arrow representing the learning continuum from prelicensure through practice trajectory is situated at the bottom of the circle in Fig. 45.2.

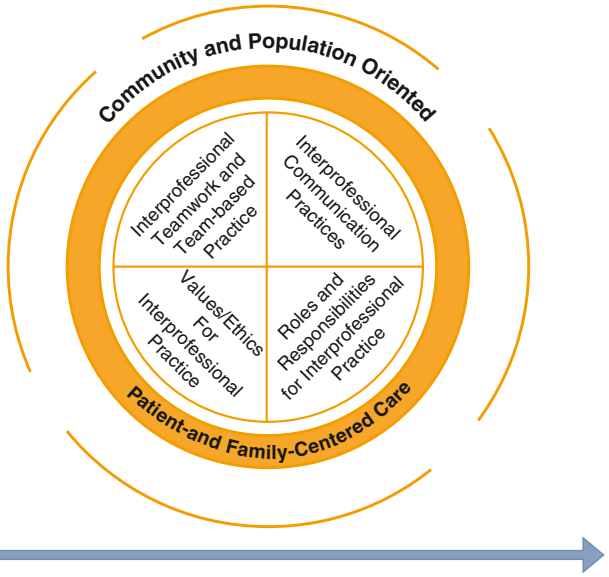
Community and Population Oriented
Interprofessional Teamwork and Team-based Practice
Interprofessional Communication Practices
Values/Ethics For Interprofessional Practice
Roles and Responsibilities for Interprofessional Practice
Patient-and Family-Centered Care
The Learning Continuum pre-licensure through practice trajectory

FIG. 45.2 Interprofessional Collaborative Practice Domains. (From Interprofessional Education Collaborative Expert Panel. [2011]. *Core competencies for interprofessional collaborative practice: Report of an expert panel.* Washington, DC: Interprofessional Education Collaborative.)

CORE COMPETENCIES

Collaboration

- Describe the process of team development and the roles and practices of effective teams.
- Respect the unique cultures, values, roles/responsibilities, and expertise of other health professions allowing high standards of ethical conduct and quality of care in all health professionals' contributions to team-based care.
- Recognize how one's own uniqueness, including experience level, expertise, culture, power, and hierarchy within the healthcare team, contributes to effective communication, conflict resolution, and positive interprofessional working relationships
- Use the full scope of knowledge, skills, and abilities of available health professionals and healthcare workers to provide care that is safe, timely, efficient, effective, and equitable.
- Communicate with team members with active listening and encouragement of ideas to clarify each team member's responsibility in executing components of a treatment plan or public health intervention.
- Work in cooperation with those who receive care, those who provide care, and others who contribute to or support the delivery of health promotion, disease prevention, and care in all health services.
- Using leadership practices that support collaborative practice, engage other health professionals—appropriate to the specific care situation—in shared patient-centered and community problem solving.

CONTEXT TO NURSING AND HEALTH CARE

The implications for collaboration and the nursing profession are expansive. The ANA's *Code of Ethics for Nurses* specifically addresses the importance of collaboration.[30] The code addresses the complexity of healthcare delivery systems, requiring a multidisciplinary approach with the strong support and active participation of all health professions. The code states that within the context of collaboration, nursing's unique contribution, scope of practice, and relationship with other health professionals needs to be clearly articulated, represented, and preserved. Nurses are encouraged to work together to ensure all relevant parties have a voice in informed decision making and patient care issues. Nurses are also encouraged to promote collaborative planning to ensure the availability and accessibility of quality health services. The code also addresses the importance of intraprofessional collaboration—that is, collaboration of practice nurses with educators, researchers, and administrators—because effective care is accomplished through the interdependence of nurses in differing roles.

For more than 10 years, the Quality and Safety Education for Nurses (QSEN) initiative anticipated that collaboration had a major effect on positive patient outcomes and improved quality of care.[31] To date, however, conclusive results from research have been difficult to determine because of various definitions of collaboration, difficulty in measuring levels of collaboration, and small sample sizes. Despite the difficulties of defining and measuring collaboration, there are hundreds of published narratives and reports involving interprofessional collaboration. Nursing is embracing the values and ethics of interprofessional collaboration by recognizing the roles of other team members and other disciplines. Effective communication with patients,

families, and other health professionals and nurturing relationships to develop safe care contribute to the health of individuals and communities.[32] The importance of collaboration was heightened during the COVID-19 pandemic and hopefully solidified collaborative practices to achieve better outcomes and address important worldwide healthcare issues.

The value of collaboration appears prominently in nursing curricula. For example, new education standards from the American Association of Colleges of Nursing[33] emphasize the importance of collaboration in healthcare quality and safety, in the advancement of scholarship and policy development based on new evidence, and in work with population health.

Collaboration also has potential to benefit health care at the organizational level. Achieving a sense of belonging and team identity is, however, more difficult at the organizational level because differences can exist between corporate cultures, geographic distances can be challenging, and formal paths of communication can be difficult to navigate. Research of collaboration between nurses and healthcare professionals from other organizations is encouraged as nurses have much to contribute to interorganizational collaboration.[34]

INTERRELATED CONCEPTS

Because there are many closely related concepts, collaboration is, at times, a fluid concept. Fig. 45.3 presents these interrelationships. **Professional Identity** involves use of nursing's full scope of knowledge, skills, and abilities while clearly articulating the role of nursing in collaboration and respecting the boundaries of diverse professions. **Ethics** involves nurses' ethical comportment when working in cooperation with various professions, patients, and families. Altruism, excellence, caring, respect, and accountability are important considerations. **Communication** is also an important ingredient of collaboration because individuals from diverse backgrounds and professions need openness and clear communication skills and strategies for collaboration to occur.

The concept of **Care Coordination** is closely aligned and intertwined with collaboration; it is not possible to achieve highly efficient coordination of care without clearly effective collaboration among healthcare professionals and resources. Care coordination involves ensuring appropriate delivery of services and information, as well as coordination of resources to ensure optimal health and care across settings and time. These efforts occur while nurses, patients, and interprofessional teams collaborate to resolve a specific caregiving situation.

The outcomes of collaboration include healthcare quality and safety. **Health Care Quality** is a desired outcome when collaboration occurs. Serious quality problems continue to plague the healthcare industry despite highly trained and technically skilled professionals. Error prevention, specifically reducing sentinel events and near-miss events, requires a whole systems' approach that seeks to understand the parts and their interactions, as well as the broader context in which they are embedded. Questions involving the expectations, assumptions, habits, behaviors, history, and tradition that influenced an adverse situation must be asked. A better understanding of the whole is needed for intelligent leadership and quality results in today's healthcare organizations. Collaboration with diverse professionals and patient-centeredness can make this happen. **Safety** is also a concept that is influenced by collaboration. Multiple threats to patient safety and errors occur at all levels of healthcare delivery. The National Academy of Medicine (NAM) has changed from an emphasis on errors to widespread system change to ensure safety. A culture of safety is being promoted. The NAM encourages training programs for effective communication and collaboration including transitions and handoffs. Collaboration is at the heart of resolving safety issues and creating a culture of safety in nursing and health care.

CLINICAL EXEMPLARS

The concept of Collaboration with patients, nurses, and other professionals clearly has the potential to improve the safety and quality of healthcare delivery. Nurses must continue to find ways to clearly articulate the nursing component of health care in

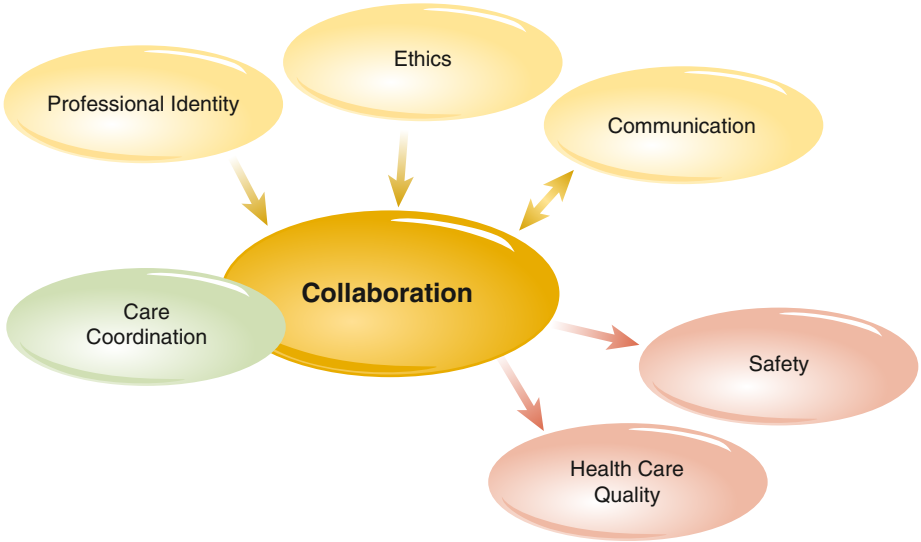

FIG. 45.3 Collaboration and Interrelated Concepts.

collaborative arenas. Involvement of nurses in the development of models of collaboration and development of collaborative interventions is needed. These collaborative strategies will continue to benefit patients, nursing, other professions, and healthcare organizations. There are many examples of collaboration within nursing and health care. These are presented as exemplars in Box 45.1, using the categories previously discussed.

Featured Exemplars

Patient Care Handoffs

Handoffs using communication tools such as SBAR (*S*ituation, *B*ackground, *A*ssessment, and *R*ecommendation) offer opportunity for collaboration in many situations. Collaborative handoffs can occur between nurses during shift change, between nurses when transferring patients to different units or facilities, between nurses and providers when receiving orders on patients, or between nurses and other healthcare workers when communicating critical information about patients. Many entities, such as The Joint Commission and the Institute for Health Improvement, recognize collaborative handoffs as an important strategy for the safety of patients.

BOX 45.1 EXEMPLARS OF COLLABORATION

Nurse–Patient Collaboration
- Collaboration on plan of care
- Collaboration from time of assessment to discharge plan
- Home care models
- Community partnerships
- Community-based participatory research

Nurse–Nurse Collaboration
- Quality improvement project
- Mentoring programs
- Dedicated information exchange: meetings, memos, e-mail
- Shared governance
- Patient care handoff
- Student nurse collaborative learning

Interprofessional Collaboration
- Rapid response teams
- Ethics committees
- Specialty care teams
- Patient rounding
- Team meetings for information exchange
- Quality improvement committee to discuss near-miss or sentinel events
- Patient care handoff
- Disaster preparedness teams
- Interprofessional education
- Interprofessional practice

Interorganizational Collaboration
- Regional, national, or international coalitions
- Healthcare consortiums

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Interprofessional Education

Participation in IPE events in educating nurses, medical students, pharmacy students, and many other healthcare professions is an outcome goal in almost every healthcare college or university. Students are exposed to many different disciplines and their role in caring for patients. Students collaborate with each other on a variety of interprofessional projects, including quality and safety initiatives, community health projects, disaster preparedness, collaborative care in clinical settings, and many other interprofessional opportunities. IPE is recognized as an important educational component as students enter the workforce and collaborate for the best outcomes for patients, families, and communities.

Community Partnerships

Healthcare professionals from many disciplines come together to work on a common initiative important to their community, such as a collaborative initiative on child abuse and neglect. In such an example, the collaborative collectively works on goals and strategies to ameliorate this identified community problem. Other examples of community collaboratives include homelessness, access to health care, nutrition in schools, and care of the elderly. Communities collaborated during the COVID-19 pandemic to locate needed patient ventilators, personal protective equipment, and even housing for healthcare workers unable to return to their homes. The potential for positive healthcare outcomes for local, national, and international communities is endless with individuals and communities working toward a common goal.

Patient Rounding

Patient rounding refers to the process of purposeful rounds to see each patient in each room or area on a regular basis. Patient rounding is often done by interprofessional teams to monitor progress and clearly communicate goals and a plan for each patient. Patient rounds are frequently mentioned as a means for collaboration, but reviews are mixed with regard to whether this is an effective strategy for collaboration.[35] Patient rounding may also be done by a nursing staff with the goal to check on patients on a predetermined basis (e.g., hourly) to determine whether they have any needs, such as addressing pain level and assisting them with basic needs.

Specialty Care Team

A specialty care team is an interprofessional team of healthcare professionals who work together around a specific type of patient or population need. Specialty team members represent various disciplines (medicine, nursing, pharmacology, physical therapy, occupational therapy, nutrition, social work, etc.) and contribute to the team by sharing their area of expertise, thus providing the best collective thinking for patient care. Examples of specialty care teams include pediatric, geriatric, pain, wound care, pulmonology, oncology, cardiac, and palliative care teams.

CASE STUDY

Case Presentation

Melanie is a 4-year-old girl with cystic fibrosis and developmental delays. She is from a small rural community. Melanie is currently hospitalized at a large tertiary care center for a "tune-up" consisting of vigorous chest physiotherapy and antibiotics. Kayla is an experienced registered nurse mentoring Janelle, a new graduate nurse who has not worked with patients with cystic fibrosis. Together they are working with Melanie's parents on a nursing plan of care during the hospitalization. The Child Life program has also been included in Melanie's plan of care to ensure developmental appropriateness for Melanie's hospital experience.

The pediatric pulmonary team (consisting of the pulmonologist, social worker, nutritionist, nurse practitioner, and nurse educator) meets with Melanie's parents and the pediatric unit nursing staff to discuss the need for a gastrostomy tube because of Melanie's poor weight gain and past aspiration episodes. Via telehealth modalities, Melanie's primary care provider, a pediatric nurse practitioner from Melanie's hometown, joins the team conference. Kayla has also linked Melanie's family with a parent advocacy group and has invited a representative to be present at the meeting to ensure understanding of the presented information. Melanie's parents ask many questions regarding the gastrostomy tube placement. The questions are met with open, honest answers using evidence-based information as appropriate. Joint decision making occurs with agreement to have the surgery scheduled. At the end of their shift, Kayla and Janelle hand off information to the oncoming nurse at Melanie's bedside. The parents are present to hear and contribute to the report and plans for Melanie's care. Kayla and Janelle leave work feeling a sense of joy and accomplishment.

Case Analysis Questions

1. Reflecting on the scope of the concept, what type of opportunities for collaboration are evident in this case?
2. Which attributes of collaboration are apparent in this case?

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CONCEPT
46

Safety

Gail E. Armstrong and Gwen Sherwood

Patient safety has always been fundamental to the delivery of responsible health care. Over the past two decades new knowledge, skills, and attitudes have magnified how it is understood and operationalized. New theories and frameworks inform current applications of safety science that describe the effect of complex systems as a context of health care, how errors and near misses are recognized and reported, ways to manage the myriad of human factors that affect safe care delivery, and competencies required for health professionals to work in cultures of safety. These concepts undergird the new safety science for health care adapted from the approach to safety first developed in other high-performance industries and are now being adapted to healthcare systems.

Important shifts in these advances focus not only on considering personal responsibility and accountability in the delivery of safe care but also on how to direct efforts to system improvements to mitigate the possibility of errors. Nursing has historically focused on maintaining patient safety and integrating new concepts of keeping patients safe. Safety science requires all healthcare professionals to adopt the new knowledge, skills, and attitudes to achieve practice changes identified in national reports from the Institute of Medicine (IOM) (renamed the National Academy of Science, Engineering, and Medicine). The new focus extends personal responsibility and accountability by incorporating safety from a systems perspective with analysis of events to identify and design system changes to prevent future occurrences.

Ongoing focus on patient safety has resulted in a decrease in adverse events in hospital care. For example, according to the 2021 *National Healthcare Quality and Disparities Report,* 40% of the patient safety measures captured between 2019 and 2019 improved.[1] The three measures with the most improvement reflect fewer adverse events in nursing homes and fewer adverse drug events involving the blood thinner heparin in the hospital setting.[1]

DEFINITION

Many of the safety concepts used to improve today's healthcare system originate from the IOM's groundbreaking work in patient safety. Beginning with the 2000 publication, *To Err Is Human,* the IOM alerted the healthcare industry and the public to the problem of deaths from preventable errors. In this report, the IOM offers a definition of safety as *"freedom from accidental injury."*[2] An expanded definition of patient safety in the report's appendix goes further: "Freedom from accidental injury; ensuring patient safety involves the establishment of operational systems and processes that minimize the likelihood of errors and maximizes the likelihood of intercepting them when they occur."[2] In *Crossing the Quality Chasm* (2001), the IOM defines safe care as "avoiding injuries to patients from the care that is intended to help them."[3] An important emphasis in this IOM report is the expectation of consistent safety in our healthcare systems:

> *The healthcare environment should be safe for all patients, in all of its processes, all of the time. This standard of safety implies that organizations should not have different, lower standards of care on nights and weekends or during time of organizational change.*[3]

In a third report in this series, *Keeping Patients Safe* (2004), the IOM defines safe care as "*care that maintains a focus on using evidence in clinical decisions to maximize the health outcomes while also reducing the potential for harm.*"[4] In its exploration of safe care, this IOM report addresses errors of commission (did not provide correct care) as well as errors of omission (did not provide care).[4]

The National Patient Safety Foundation (NPSF), formerly an independent, not-for-profit organization with a mission to improve the safety of care for all patients, merged with the Institute for Healthcare Improvement. NPSF defines patient safety as *the "prevention of health care errors, and the elimination or mitigation of patient injury caused by healthcare errors."*[5] To further clarify this definition, NPSF defines healthcare errors as unintended healthcare outcomes caused by a defect in the delivery of care to a patient. Errors may be made by any member of the healthcare team in any healthcare setting.[5] A recent concept analysis of the concept of patient safety includes prevention of medical errors and avoidable adverse events; collaborative efforts by individual healthcare providers; and a strong, well-integrated healthcare system.[6]

The NPSF report, *Safety Is Personal: Partnering with Patients and Families for the Safest Care,* emphasizes how collaboration with patients and families through ongoing engagement can transform safety outcomes. Specific action items are clearly identified to enable health leaders, clinicians, and policymakers to accentuate the overlap of engagement and patient safety as interrelated phenomena. A key component is how providers, especially nurses, work with the patient and family as a safety ally, such as inviting them to observe and report gaps or omissions in care to help avoid errors and near misses.[7]

The National Steering Committee for Patient Safety (NSC) marshaled insights by 27 member organizations on achieving safer care. Recommendations from this report, *Safer Together: A National Actional Plan to Advance Patient Safety,* focus on the need for a total systems approach: a managed anticipatory strategy in which risks are predicted and systemwide safety processes are adopted across a healthcare continuum through dedicated collaboration among all partners.[8] Recommendations from this report focus on five key areas: culture, leadership and governance, patient and family engagement, workforce safety, and learning system.

Acknowledging that patient safety outcomes are directly related to system effectiveness expands the clinical lens for examining patient safety. A system's ability to address social determinants of health affects patient safety.[9] Social determinants of health can be grouped into five domains: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context.[10] The direct role of social determinants of health in safety events is still evolving based on recent studies suggesting important connections.[10] Social determinants, however, clearly correlate with underlying, contributing factors of health inequities based on a range of factors from unequal access to health care and racial injustices. Addressing social determinants of health is large-scale work to improve large-scale health disparities which influence outcomes.[11]

The work of defining safety and safe care by the IOM is relevant for all healthcare professionals and emphasizes safety from the patient's perspective. In nursing, a Robert Wood Johnson Foundation-funded national initiative, Quality and Safety Education for Nurses (QSEN), built on IOM's work and defines safety as *"minimizing risk of harm to patients and providers through both system effectiveness and individual performance."*[12] This competency definition is further explicated by the necessary knowledge, skill, and attitude elements to demonstrate safety in one's practice and can be found on QSEN's website (http://qsen.org).

In developing safe nursing practice, defining the levels of errors provides a guide to reporting safety events:

- ***Adverse event:*** An event that results in unintended harm to the patient by an act of commission or omission rather than by the underlying disease or condition of the patient.[13]
- ***Near miss:*** An error of commission (did not provide care correctly) or omission (did not provide care) that could have harmed the patient, but serious harm did not occur as a result of chance (e.g., the patient received a contraindicated drug but did not experience an adverse drug reaction), prevention (e.g., a potentially lethal overdose was prescribed, but a nurse identified the error before administering the medication), or mitigation (e.g., a lethal dose was administered but discovered early and countered with an antidote).[13]
- ***Sentinel event:*** A sentinel event is an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Serious injury specifically includes loss of limb or function. The phrase "or the risk thereof" includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome. Such events are called "sentinel" because they signal the need for immediate investigation and response.[13]

SCOPE

The concept of Safety is broad and encompasses the ideal of keeping all patients safe as well as the unfortunate reality that human actions can and will result in errors that can lead to injury or death (Fig. 46.1). The definitions of safety and levels of errors are the basis for gaining an understanding of the types of errors, placement of errors, and approaches for building a culture of safety.

Types of Errors

In nursing, safety has focused on the safe execution of specific procedures and tasks. However, recent safety work has emphasized the variety of errors that compromise patient safety and the range of variables that affect the occurrence of errors in health care. Understanding types of errors in health care is a vital element in addressing individual practice and improving healthcare systems. In its early report, the IOM cites a pioneer in the field of patient safety, Lucian Leape, who identified four types of errors:[14]

1. Diagnostic errors are the result of a delay in diagnosis, failure to employ indicated tests, use of outmoded tests, or failure to act on results of monitoring or testing.
2. Treatment errors occur in the performance of an operation, procedure, or test; in administering a treatment; in the dose or method of administering a drug; or in avoidable delay in treatment or in responding to an abnormal test.
3. Preventive errors occur when there are failures to provide prophylactic treatment and inadequate monitoring or follow-up of treatment.
4. Communication failure (meaning a lack of communication or a lack of clarity in communication) can lead to many types of errors.

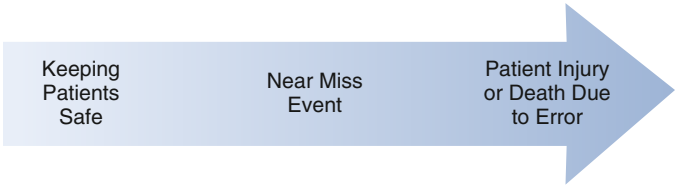

FIG. 46.1 Scope of Concept: Safety.

By employing a standardized system for classifying different types of errors, best practices can be developed to address safety compromises in healthcare systems.

Placement of Errors

Along with types of error, the placement of errors may be described as active or latent. This distinction is important in further understanding the etiology of healthcare errors and appropriate improvements. In health care, active errors are made by those providers (e.g., nurses, physicians, and technicians) who are providing patient care, responding to patient needs at the "sharp end," which is at the point of care (Fig. 46.2).[15,16] Latent conditions are the potential contributing factors that are hidden and lie inactive in the healthcare delivery system, originating at more remote aspects of the healthcare system, far removed from the active end.[17] Latent errors—more organizational, contextual, and diffuse in nature or design-related—are called errors occurring at the "blunt end."[15] A latent failure is a flaw in a system that does not immediately lead to an accident but establishes a situation in which a triggering event may lead to an error.[18] Identifying errors as either active or latent in origin allows more accurate identification and correction of the exact system that needs improvement. Most bedside nurse clinicians operate at the sharp end of health care and are involved with active errors or inherit latent errors that can manifest as active errors. For example, a nurse who administers the incorrect medication because of a failure to check the medication order is involved in an active error. However, a medication error can occur in which a latent error leads to an active error; Box 46.1 illustrates this point.

Improving safety is a continual balance of individual competence and awareness of safety with the need for system improvements—for example, safety is a partnership between individuals and the systems in which they work. Recent models for improving safety across the complex systems in health care emphasize addressing system safety because of increased awareness of latent errors. A 2017 Institute for Healthcare Improvement (IHI) white paper, *A Framework for Safe, Reliable and Effective Care,* focuses on two foundational domains for preventing errors: healthcare culture and the learning system.[19] The report emphasizes that in addition to teaching individuals and teams, advances are needed for designing safer healthcare systems to address the many kinds of errors that occur.

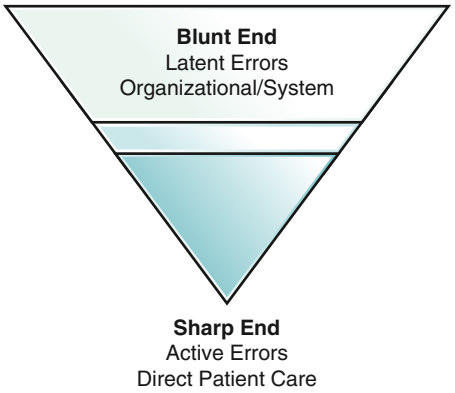

FIG. 46.2 Active and Latent Errors.

ATTRIBUTES AND CRITERIA

Concept attributes are qualities or characteristics that are always associated with the concept. In a formal concept analysis of patient safety, Kim and colleagues[6] reported the following defining attributes:

- Prevention of medical error
- Avoidance of serious adverse and sentinel events
- Protection of patients from harm or injury
- Collaboration among individual healthcare providers
- Strong, well-integrated healthcare system

These attributes are well represented in the safety literature and also represent elements noted in many of the definitions presented in the previous section. These attributes also reflect the desired outcomes of patient care when nurses apply the knowledge, skills, and attitudes (competencies) associated with safety within their clinical practice.

THEORETICAL LINKS

Several theoretical frameworks associated with safety have been developed to further explicate safety. Three are presented here and include human factors frameworks, models that support highly functioning teams, and high reliability organization models.

Human Factors Framework

Principles of human factors have been adapted from engineering and expanded to address processes in health care by

BOX 46.1 High-Profile Medication Error

A highly publicized 2017 error involved nurse RaDonda Vaught who administered a fatal dose of a neuromuscular blocking agent to an unventilated patient. Working as a help-all nurse floating across various hospital units, Vaught thought she was administering a different drug (midazolam). Vaught used the override function in the automatic dispensing cabinet (ADC) despite alerts and notifications. In her role as the help-all nurse, Vaught was called to another unit and the patient to whom she administered the erroneous neuromuscular blocking agent was left unmonitored. The patient was found pulseless and breathless, and a rapid response team/code blue was called. After resuscitation, the patient's neurologic status declined, and the patient died after life support was withdrawn. A variety of system gaps and nurse errors contributed to this tragic outcome. In a thorough analysis of the case, the Institute for Safe Medication Practices (ISMP) has made recommendations around optimizing profiled ADCs, managing override lists, blocking staff from loading inappropriate medications, utilizing warnings during medication removal, allowing simultaneous searching by brands and generic names in an ADC, supporting distraction-free ADC medication removal, limiting access to ADCs in certain clinical units, and affixing auxiliary warning labels to ADC pockets where appropriate.

From: Institute for Safe Medication Practices. (2019). *Safety enhancements every hospital must consider in the wake of another tragic neuromuscular blocker event.* https://www.ismp.org/resources/safety-enhancements-every-hospital-must-consider-wake-another-tragic-neuromuscular

studying the interrelationship between people, technology, and the environment in which they work.[20] Human factors consider the ability or inability to perform exacting tasks while attending to multiple things at once. Human factors offer a systematic approach to studying process and outcome effectiveness for greater error prevention and greater efficiency. Within human factors healthcare research, attention is paid to all levels of care provision: external environment, management, physical environment, human–system interfaces, organizational/social environments, the nature of the work being done, and individual characteristics and aspects of performance.[17] Recent human factors research in patient safety has focused on the ability of systems to anticipate the potential for failure through focusing on usability of technology, human error, and clinician performance and resilience.[21]

In applying a human factors framework to health care, the emphasis is on both supporting healthcare professionals' performance and eliminating hazards. Human factors is another example of the interdependence between individuals and systems. Supporting healthcare professionals' performance in systems design includes physical performance, cognitive performance, and social/behavioral performance.[22] Simultaneously, consideration should be given to designing systems that avoid hazards. A hazard is anything that increases the probability of errors or patient/employee injury.[22] The dual consideration of supporting healthcare professionals and eliminating hazards is a qualitative shift to the development of systems that do not respond reactively to error occurrence but instead work proactively to avoid errors in an anticipatory way through the purposeful design of safer systems. A culture of safety requires organizational leadership that gives attention to human factors such as managing workload fluctuations, seeking strategies to minimize interruptions in work, and attending to communication and coordination across disciplines including power gradients and excessive professional courtesy.

Applying a human factors framework to guide research in appreciating and quantifying processes that lead to error will increase our understanding of the complexity of nurses' work in the acute care environment. Ebright and colleagues identify eight patterns that represent to the intersection of human factors and the complexity of nursing work in the acute care environment:[18]

- Disjointed supply sources
- Missing or nonfunctioning supplies and equipment
- Repetitive travel
- Interruptions
- Waiting for systems/processes
- Difficulty in accessing resources to continue care
- Breakdown in communication
- Communication media

Using a human factors paradigm to guide research highlights how work complexity can threaten patient care continuity and contribute to medical error.[18] Every day, nurses confront human factors situations that affect safety. Examples include multitasking, distractions, complacent attitudes, fatigue, failure to follow up, failure to follow protocol, and task fixation that limits environmental scanning. Helping nurses understand human factors can inform their understanding of safety and further facilitate nursing's contributions toward the development of safer healthcare delivery systems.

Models that Support Highly Functioning Teams

High-functioning teams are recognized as a critical factor in improving patient safety outcomes. As evidence-based team strategies identified in AHRQ's TeamSTEPPS tools[23] continue to be adopted, healthcare teams are increasingly adopting standardized communication strategies. Using well-recognized team strategies, such as daily huddles, contribute to an equitable environment where front-line staff can speak freely about patient concerns.[24] This element of psychological safety is critical to effectively addressing patient safety concerns in the complex environment of health care. Unparalleled stress on the healthcare system during the COVID-19 pandemic illustrated the connection between a supportive workplace environment (i.e., a health work team) and reduced moral injury for healthcare workers navigating the stress of the global pandemic. Psychological safety is vital for healthcare teams, more and more appreciated for contributing to organizational resilience and staff retention.[25]

Crew resource management (CRM) training was developed in the aviation industry to standardize procedures, standardize communication, decrease errors, and increase efficiency. Within aviation, CRM has been defined as a set of instructional strategies designed to improve teamwork by applying well-tested training tools (e.g., performance measures, exercises, and feedback mechanisms) and appropriate training methods (e.g., simulators, lectures, and videos) targeted at specific content (i.e., teamwork knowledge, skills, and attitudes).[26] CRM emphasizes the role of human factors in high-stress, high-risk work environments. The work environments of health care and aviation share the characteristics of high stress, complexity, the need for highly functioning teams, the importance of accurate and precise communication, and the high cost of system failures.[27] CRM has been used to improve team functioning in operating rooms, emergency departments, labor and delivery, and perioperative areas.

High-Reliability Organization Models

An increased appreciation that healthcare systems operate as complex systems has shifted patient safety from only an individual or team concern to a system concern. With increased awareness of the complexity of healthcare systems, new approaches have been studied to managing innovation that effectively address patient safety concerns.[28] Unprecedented stress on healthcare systems during the COVID-19 pandemic also provided evidence that stress to individuals (e.g., nurse burnout) may be better understood and addressed as an organizational and collective phenomenon.[29]

High-reliability organizations (HROs) manage work that involves hazardous environments (e.g., nuclear power plants and air traffic control agencies) in which the consequences of errors are high, but the occurrence of error is low.[30] AHRQ offers resources for hospitals or other organizations to adapt and apply the principles and characteristics of HROs.[31]

HROs share power and standardized communication. Especially in the acute care setting, nurses are often the most informed bedside clinicians to a potential error and have an obligation to speak up to share critical information. HROs have an explicit value of safety at the organizational level. Organizational leadership aligns safety goals with mission and vision so that safety is explicitly valued throughout all areas and levels of the organization (Box 46.2). A hospital is a system, a set of interdependent components that interact to achieve a common goal. Hospitals are composed of interdependent components such as service lines, nursing care units, ancillary care departments, and outpatient care clinics that interact to achieve a common goal of care delivery. The way in which these separate but united system components interact and work together is a significant factor in delivering high-quality safe care, and the more that clinicians understand the interrelationships, the more effectively they can coordinate care. HROs have a multilevel focus on safety; it is pervasive in the culture, and all employees demonstrate a mindful approach to their work so that they maintain awareness of where the next error may occur and implement prevention strategies.[32]

BOX 46.2 Five Characteristics of Effective High-Reliability Organizations (HROs)

1. HROs exhibit sensitivity to operations. Beyond policies and manuals, there is a "situational awareness" among HROs in which process anomalies and outliers are quickly identified. Sensitivity to operations both reduces the number of errors and facilitates prompt recognition to avoid larger consequences from errors.
2. HROs are preoccupied with failure and focused on predicting and eliminating errors rather than being in the position of reacting to errors. HROs view near misses as opportunities to improve current systems by examining strengths and weaknesses and addressing gaps.
3. HROs have a reluctance to simplify. These high-functioning organizations accept the complexity inherent in their work and do not accept simplistic solutions for challenges intrinsic to complex systems. In complex work environments, different team members may have information at different times.
4. Effective HROs exhibit deference to expertise and cultivate a culture in which team members and organizational leaders defer to the person with the most knowledge of the current issue or concern. The team member with the most information may not be the individual with the highest rank, deemphasizing hierarchy.
5. HROs exhibit a commitment to reliance. HROs pay close attention to their ability to quickly contain errors and return to functioning despite setbacks.

From: Oster, C. A., & Braaten, J. S. (2020). *High reliability organizations: A healthcare handbook for patient safety & quality* (2nd ed). Indianapolis, IN: Sigma Theta Tau Press.

CORE COMPETENCIES

Safety

- Consistently engage patient and family in care processes.
- Integrate national safety standards into practice.
- Apply standardized, evidence-based processes in care delivery.
- Promote safety and preventing errors and near misses within the interprofessional team.
- Reduce harm by communicating concerns about hazards, near misses, and errors to patients, families, and the healthcare team.
- Understand the limits of safety-enhancing technologies such as bar code medication administration and EHRs.
- Reduce reliance on memory through evidence-based tools.
- Participate in error investigation emphasizing system gaps and priorities for improvement.

CONTEXT TO NURSING AND HEALTH CARE

Culture of Safety

Advancements in safety over the past decade redirect healthcare clinicians and healthcare organizations to develop a clear focus on patient outcomes. Historically, a culture of blame has been pervasive in health care. When an error occurred, the first response was identifying the clinician at fault and meting out discipline.[33] Focusing on the role of safety in patient outcomes encourages healthcare teams to investigate what went wrong rather than simply blaming the individual clinician who executed the error. Balancing blame within the broader context of a culture of safety is vital in effectively addressing error occurrence. The Health and Safety Commission of Great Britain issued a commonly cited definition of safety culture utilized by the Agency for Healthcare Research and Quality (AHRQ): "The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management."[34] Recent studies on the effect of developing a hospital culture of safety links higher levels of patient safety culture with higher safety performance. Hospitals where employees reported more fear and shame had a significantly higher risk of safety problems.[35]

From an organizational context, a culture of safety acknowledges the influence of complex systems and human factors that influence safety. In a culture of safety, the focus is on teamwork to accomplish the goal of safe, high-quality care. When errors or near misses occur, the focus is on what went wrong rather than on who committed the error. The focus shifts from identifying fault, to establishing blame and determining discipline, to acknowledging and reporting errors and near misses to improve the system. Accountability is a critical aspect of a culture of safety; recognizing and acknowledging one's actions is a trademark of professional behavior.

Safety culture literature identifies seven aspects that define the concept and, thus, contribute to a culture of safety in a healthcare organization: leadership, teamwork, an evidence base, communication, learning, a just culture, and patient-centered care.[36] Safety culture is complex and is built through support from the organization leadership, policy, and the bedside clinician.[36] Empowering staff to participate in an error-reporting system without fear of punitive action is an essential aspect of creating a culture of safety. A major barrier to reporting medication errors and near-miss events is fear of professional or personal punishment.[37-39] As the largest segment of the healthcare workforce, nurses are central to creating and maintaining a

culture of safety in any healthcare setting. From the bedside to the administrative suite, nurses can contribute to all aspects of a culture of safety.

Just Culture

Data about errors have not always been accessible to healthcare professionals or to healthcare consumers. To create a culture of safety, adverse events must be reported so they can be analyzed for lessons learned and new procedures drafted to improve the system. "Just culture" refers to a system's explicit value of reporting errors without punishment, and therefore, as noted earlier, it is a signature component of a safety culture. A just culture is one in which people can report mistakes or errors without reprisal or personal risk.[32] A just culture does not mean individuals are not accountable for their actions or practice, but it does mean that people are not punished for flawed systems. A just culture promotes sharing and disclosure among stakeholders, including the patient and family.[32]

A just culture seeks to balance the need to learn from mistakes and the need to implement corrective or disciplinary action.[4] The IOM recommends that, in most cases, front-line workers should be protected from disciplinary action when they report injuries, errors, and near misses, even if they were personally involved, to encourage transparency in the system. These recommendations are based on literature review of other high-risk industries such as aviation safety, nuclear power, and high-reliability military operations. Without such protections, injury-reporting rates may drop and, thus, impede the ability to prevent future injuries. The IOM provides exceptions to such protection, however, if an error involves criminal behavior, active malfeasance, or cases in which an injury is not reported in a timely manner.[4]

Consequences for errors in a just culture are commonly addressed by a model proposed by David Marx. Marx differentiates *human error* from *at-risk* behavior and *reckless* behavior. Human error is an inadvertent action: a slip or lapse. At-risk behavior is behavioral choice that increases risk when risk is not recognized or is mistakenly believed to be justified. Reckless behavior is a behavior choice to consciously disregard a substantial risk. Each level of error involves differing responses from leadership. Human error is best remedied by training, redesigning the system, and improving procedures. At-risk behavior is best mitigated by creating incentives for healthy behaviors, increasing situational awareness, and providing education. Marx suggests remedial or punitive action in instances of reckless behavior.[40] Systems that use models that respond appropriately to varying levels of error contribute to increased reporting of errors and near misses.[41]

Incorporating Competencies Within Nursing Practice

What knowledge, skills, and attitudes are required for nurses to effectively contribute to safety in health care? The QSEN project has been the national leader in defining the competency for safety by specifying the knowledge, skill, and attitude objectives for prelicensure students. More recently the American Association of Colleges of Nursing (AACN) has identified essential competencies for prelicensure and advanced practice nurses.[42] The AACN model maps out competencies and subcompetencies across 10 domains identifying necessary concepts and spheres that must be addressed in nursing education programs. Elements of safety thread through each domain and is specifically defined in the domain quality and safety.

Knowledge

Historically, the emphasis in nursing has been on the safe execution of discrete skills. To address current healthcare demands, nurses need knowledge for examining human factors and other basic safety design principles as well as recognizing commonly used unsafe practices (e.g., workarounds and dangerous abbreviations). Nurses need to be able to describe the benefits and limitations of selected safety-enhancing technologies (e.g., barcodes, computerized provider order entry, medication pumps, and automatic alerts/alarms). Educating nurses in effective strategies to reduce reliance on memory (e.g., checklists) encourages nurses to understand safety as an individual as well as a systems phenomenon. As nurses become more knowledgeable about safety at the systems level, they can delineate general categories of errors and hazards in care (e.g., active vs. latent and diagnostic, treatment, and preventive errors). Nurses need to be able to describe factors that create a culture of safety (e.g., open communication strategies and organizational error-reporting systems). Nurses must understand the processes used in understanding the cause of error and allocation of responsibility and accountability through such processes as root cause analysis (RCA) and failure mode effects analysis (FMEA). An important facet of nurses' knowledge is their appreciation of the potential and actual effect of national patient safety resources, initiatives, and regulations to effectively use and contribute to these important facets of standardized safe practices.

Skills

Nurses need skills to utilize tools that contribute to safer systems. For example, nurses must develop skills in the effective use of technology and standardized practices that support safety and quality as well as effectively use strategies to reduce risk of harm to self or others. Communication failures are the leading cause of inadvertent patient harm.[43] It is vital for nurses to develop skills to communicate observations or concerns related to hazards and errors to patients, families, and the healthcare team. Nurses' ability to engage patient participation in safety measures is an essential element of effective patient centered care and also improves outcomes.[44] Nurses have the responsibility to use organizational error-reporting systems for near miss and error reporting and to participate in analyzing errors and designing system improvements (e.g., RCAs). Nurses are responsible for their own individual practices while also contributing to the development of safer systems. Applying the national patient safety resources to his or her professional development will also enhance the capacity to focus attention on safety in care settings.

Attitudes

Nurses' personal and professional attitudes are instrumental in shaping their nursing practice and recognizing the cognitive and physical limits of human performance. Safety

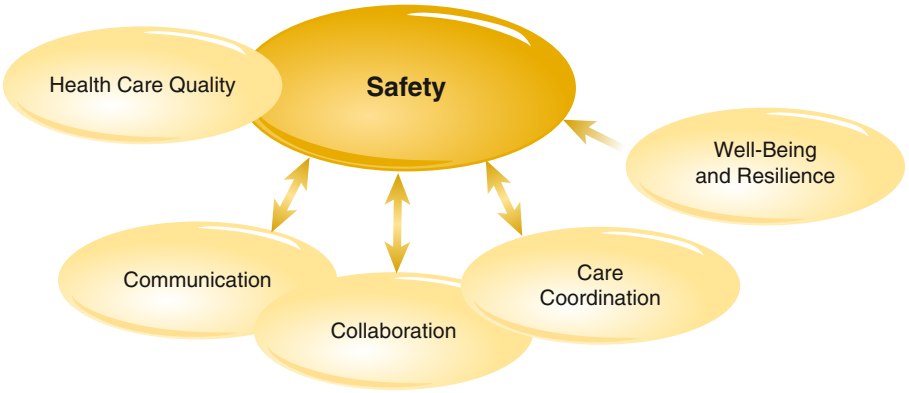

FIG. 46.3 Safety and Interrelated Concepts.

systems utilize principles of standardization and reliability—doing things in the same evidence-based way to get the same result every time—as part of error prevention strategies. Professionals value their own role in preventing errors and realize the difference that one person can make in prevention, even for one patient and family. Developing an attitude of collaboration across the healthcare team to ensure safe coordination of care contributes to safe care. It is the collective and shared environmental scanning and vigilance by all team members (e.g., patients, families, and all disciplines and staff) that prevents errors. As nurse clinicians perceive their own local practices as components of the broader national safety initiatives, patient outcomes can be incrementally improved at the local and national levels.

Transparency in Health Care

Transparency in health care is increasingly considered an ethical responsibility because it contributes to improved outcomes, fewer errors, more satisfied patients, and lower costs.[45] Transparently sharing information with patients allows them to make informed decisions about where and from whom to receive their care. This information should include information on a system's performance on safety, evidence-based practice, and patient satisfaction. The Hospital Compare website, operated by the U.S. Department of Health and Human Services, makes Health Care Quality Information from the Consumer Perspective (HCAHPS) available to consumers.

More than just making quality information available to consumers, transparency is also defined as open communication and information sharing with patients and their families about their care, including adverse and sentinel events. Timely, open, honest communication with patients and families about adverse events helps restore trust. Professionals trained in the principles and practice of transparency, usually risk management staff, communicate with the patient and family as soon as an adverse event is recognized and the patient is ready physically and psychologically to receive this information, usually within 24 hours. Specific recommendations help healthcare professionals understand how transparency can be operationalized in a healthcare system as part of just culture. Patients should be told what happened during an event. Individuals involved should take responsibility and work with trained professionals to apologize and explain how the organization will respond and what will be done to prevent future events.[46]

Transparency and disclosure are interrelated experiences. A standardized model around transparency and disclosure (often referred to as the *Michigan Model*) focuses on compensating patients quickly and fairly when inappropriate care causes injury, supporting clinical staff in coping with the trauma of the event, and reducing future injuries by learning from patients' experiences. This transparent disclosure model has demonstrated a decrease in the rate of new claims, a decline in lawsuits, decreased overall compensation costs, and offers support to clinicians.[46]

INTERRELATED CONCEPTS

Safety is a multidimensional term with several interrelated concepts. The concepts featured in this text that are most closely interrelated with safety are shown in Fig. 46.3.

Health Care Quality is very closely interrelated to safety—so much so that they really overlap. Health Care Quality is defined as identifying the gap that occurs between ideal care and actual care delivered. Quality improvement is an approach to practice that measures the variance in ideal and actual care and implements strategies to close the gap. Quality measures include benchmarks from other areas of the same institution or from peer institutions across the healthcare industry.

How well healthcare professionals work together accounts for as much as 70% of healthcare errors.[2] For this reason, **Communication, Collaboration,** and **Care Coordination** are closely related to safety. Standardized communication can ensure safe handoffs between providers or between settings, provide clear direction in seeking and sharing information between providers, and instill collaborative behaviors for speaking up to prevent errors from occurring. Collaboration begins with self-development based on emotional intelligence to monitor appropriate reactions and responses to team members. Ineffective communication, hierarchy, and disruptive behavior are challenges to patient safety and interrupt care coordination.[47] Care coordination requires cross-disciplinary communication, knowing scope of responsibility, and organizational support for speaking up when safety is compromised. Recent evidence continues to support the connection between coordination of care across settings and systems, and increased patient

BOX 46.3 EXEMPLARS OF SAFETY

Point of Care
- Prevention of decubitus ulcers
- Medication administration
- Fall prevention
- Invasive procedures
- Diagnostic workup
- Recognition of/action on adverse effects
- Communication with patients/families
- Communication with other healthcare providers

Systems Level
- Care coordination
- Documentation/electronic records
- Team systems
- Work processes
- Communication process
- Environmental systems
- Error reporting/analysis
- Regulatory systems
- National quality benchmarks

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safety.[47] Nurses need skills in problem solving, conflict resolution, and negotiation to be able to coordinate safe care across interprofessional teams. Sharing team leadership based on the provider most expert in the situation is consistent with effective HROs.

Nurse **Well-being and Resilience** are directly connected to maintaining patient safety. Nurses practice in complex work environments with ever-present stress. Recent research during the COVID-19 pandemic found that nurse burnout is a pervasive hazard that can affecting nurses, patients, and healthcare organizations.[29] Compromises in nurse well-being, or nurse burnout, is associated with worsening safety and quality of care, decreased patient satisfaction, and a decrease in nurses' commitment to their healthcare organization.

CLINICAL EXEMPLARS

The expanded view of patient safety is best described as a mindset for safe practice. Safety is hard-wired into how nurses conduct their work with a commitment to ask questions to identify risks, apply human factors to mitigate identified risks, and awareness of the consequences of nurses' actions. It is prohibitive to list the unlimited exemplars defining safety and injury prevention within health care. Box 46.3 presents the most common safety issues at the point of care and the systems level. A few of the most important exemplars are briefly described here.

Featured Exemplars

Fall Prevention

Prevention of falls is a safety concern in all living environments, especially for older adults. The American Geriatrics Society offers evidence-based clinical practice guidelines for older adults living independently, in assisted living, in long-term care facilities, and for those being cared for in the acute care environment.[48] These guidelines address recommended screening, elements of a focused history, physical examination, and functional assessment. In addition, the guidelines synthesize common fall prevention interventions and tailor them for various living situations: adaptation of the environment; minimization of psychoactive medications; attention to postural hypotension; management of foot problems and footwear; and exercises that emphasize balance, strength, and gait training.

Medication Administration

Medication administration is an essential aspect of nurses' work, especially in the acute care setting. Medication errors are the most common errors in the hospital setting, and they usually involve the frontline nurse clinician. The total cost of caring for patients with medication-associated errors exceeds $40 billion each year.[49] Interventions to decrease medication administration errors often focus on technology such as bar code medication administration or computer physician order entry, standardization of medication administration practices, or alterations to the nurses' environment to decrease distractions or interruptions. Recent research indicates that medication administration errors are reduced by both system improvement as well as clinician-focused interventions.[50]

Care Coordination

Care coordination can be defined as a set of activities purposefully organized by a team of personnel that includes the patient to facilitate the appropriate delivery of services and information necessary to support optimal health care across settings and over time. Poorly coordinated care systems contribute to safety compromises in the delivery of care. Integrated care systems are an effective method to address such system gaps. The development of care coordination models has grown out of the need to address fragmented service delivery, cost inefficiencies, and poor health outcomes.

Team Systems

Healthcare professionals provide care in teams. Safety outcomes are often closely tied to effective team functioning. Understanding team systems in health care is complex because of the high degree of variability in settings, microsystem culture, care delivery, and members of the care team. Effective team systems in health care contribute to safe, patient-centered outcomes, and proved to be even more important when healthcare systems were stressed during the COVID-19 pandemic. Evidence suggests that high-functioning teams in health care are related to clear role definition, timely information about a patient's changing health status, mutual respect among team members, consistent feedback, and participation of patient or family on the team, when desired.[51]

Error Reporting

Adverse outcomes in health care can only be addressed when reported; thus, error reporting is essential to error prevention. A reluctance to report errors may be attributed to a perceived lack of effect of the error on the patient or a patient outcome, a fear

of a punitive response by leadership or a system, or a personal sense of embarrassment about the error.[38] There is also wide variation in how errors are defined, which information should be reported, and the best approaches to mitigating the effects of errors. Addressing reluctance to error reporting at the unit culture level through implementation of just culture concepts is one evidence-based approach to this complex issue requiring advanced research.[39]

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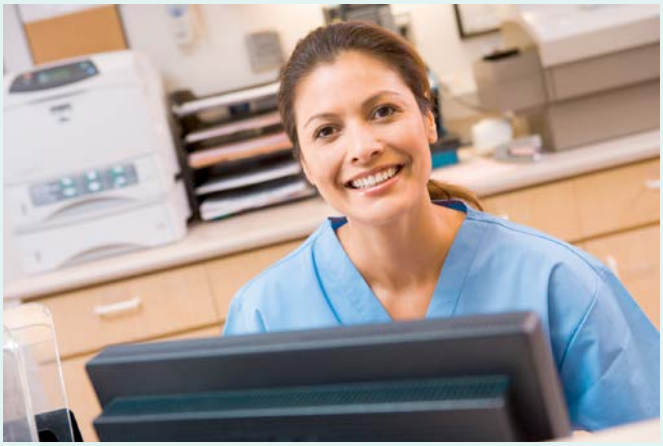
CASE STUDY



From monkeybusinessimages/iStock/Thinkstock.

Case Presentation

Gloria considers herself an expert nurse in her medical/surgical unit. She has been a registered nurse (RN) in this unit for 12 years and has seen some important changes in how care is provided. Keeping up with these changes is an important part of Gloria's practice, and many RNs look to Gloria for guidance in understanding the latest evidence.

Lately, Gloria has been concerned about the occurrence of decubitus ulcers on her unit. She knows that there are several strategies that must be employed to effectively address this deleterious patient outcome. When caring for Mr. Brown, a postoperative spinal stenosis patient, Gloria knows that at the individual practice level it is important that she establish a schedule of turning this patient every 2 hours. Gloria is aware this nursing intervention at the individual clinician level is effective in preventing decubitus ulcers.

As Gloria goes off shift after caring for Mr. Brown, she thinks about the importance of clear communication with the rest of the healthcare team about decubitus ulcer prevention for Mr. Brown. Therefore, to address safety at the healthcare team level, Gloria posts a reminder above his bed listing the turning schedule so that all healthcare team members follow the same protocol to turn Mr. Brown every 2 hours.

While Gloria cares for Mr. Brown for consecutive shifts, she thinks about the variety of ways that nurses can work with other members of the healthcare team to prevent decubitus ulcers. On his second postoperative day, Mr. Brown's surgeon mentions to Gloria that because he has been prescribed steroids, he is at especially high risk for developing decubitus ulcers. Gloria decides to address this safety concern for Mr. Brown at the unit level, and she seeks input on his care from the physical therapist to learn about skin protection products and from the dietitian to address nutritional strategies to help prevent decubitus ulcers in Mr. Brown.

When speaking with the physical therapist and dietitian about decubitus ulcer prevention for Mr. Brown, both colleagues mention the increase in the occurrence of decubitus ulcers on this medical/surgical unit. Gloria works with her manager and the quality improvement department to track the decubitus ulcer rate on her medical/surgical unit for the previous 6 months and plans to compare this rate with state and national quality benchmarks for decubitus ulcer prevention. She is also aware that many studies have been published by the Institute for Healthcare Improvement on best practices for decubitus ulcer prevention. Once Gloria has retrieved the data from her own unit to compare to other benchmarks, she will collaborate with her manager and RN colleagues to identify some systematic strategies that can be adopted on her unit. Gloria demonstrates that she understands how to address safety needs at the individual clinician level as well as at the systems level that improves patient outcomes.

Case Analysis Questions

1. In what ways does Gloria exemplify the incorporation of safety into her clinical practice?
2. Review Fig. 46.3. Which interrelated concepts are evident in this case? Are there other concepts represented in this book that also apply to this specific situation?

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CONCEPT 47

Health Care Quality

Rebecca S. Miltner

Quality is one of the most important issues in health care. Healthcare organizations and services have a duty to the communities they serve to provide high-quality care to all residents at the lowest cost. The quality of health care is intertwined with patient preferences, access to services, and the cost of care. In other words, the delivery of quality care is irrelevant if the patient cannot access care, the cost is prohibitive (either through insurance or self-pay), or the patient does not want it. Thus, both the medical provider and the nurse who want to do the best for the patient may be at odds with the patient, society norms, and best practices.

Countries and healthcare systems struggle with the issues of cost, access, and quality. In 2019 in the United States, healthcare expenditures were estimated at 17.7% of its gross domestic product, or $11,582 per person.[1] Although the United States spends more per person than any other industrialized country, 9.7% of people under the age of 65 years are without any form of health insurance to pay for care.[1] Even worse, healthcare error may be the third leading cause of death with 210,000 to 400,000 deaths per year estimated to be linked to poor quality of care.[2]

Numerous government laws and regulations, accreditation standards, and professional standards are in place to monitor quality and protect the public from harm. Hospitals and other healthcare organizations must establish structures and processes to show evidence that standards for quality are in place and upheld. Nurses are a crucial link in meeting the needs of patients and ensuring patient safety, patient-centered care, and communication as part of the healthcare team. The purpose of this concept presentation is to help students gain a general understanding of healthcare quality.

DEFINITION

The importance of healthcare quality dates back to Florence Nightingale. During the Crimean War in the mid-1800s, most soldiers died of infections, not battle injuries. Nightingale insisted on meticulous sanitation and attention to the patients' needs. In a short period of time, deaths among the wounded at Scutari were reduced from 33% of the wounded to 2%.[3] Nightingale documented this improvement with meticulously kept records. These accomplishments were initially not well received by the medical establishment, but Nightingale is now recognized not only for modern nursing practice but also for infection control, epidemiology, and hospice care.[3]

Defining quality is challenging because the meaning of "quality" can vary based on the context of care, personal expectations, and regulatory requirements. Patients, clinicians, and managers may define healthcare quality in different ways. The patient may value how much time providers spend with them or how they speak to them. Physicians may value providing cutting-edge medical interventions to optimize patient outcomes. The nurse at the bedside might view quality as the delivery of safe, caring, and competent care. The nurse manager might see quality as a ratio of volume of care in relation to the available resources or the score on a patient experience survey. One definition of healthcare quality is limiting to these many different perspectives. However, the most widely accepted definition of Health Care Quality is from the Institute of Medicine (IOM), which states that quality is *the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.*[4] This definition remains appropriate because it infers that health services must be examined at the individual and larger population levels, suggests that desired health outcomes will vary based on individual preferences and current care options, and points out that all healthcare professionals should be lifelong learners to keep up with the current evidence for their practice.

SCOPE

The patient and their family expect that every encounter with the healthcare system will be safe and of high quality. As noted before, this is not the case. Health care is one of the most complex systems because of the individual patients' needs and preferences, the number and type of healthcare professionals involved, and the organizations' missions and resources. Therefore, the scope of Health Care Quality as a concept is broad and encompasses most healthcare activities from direct patient care to health policy at the state, national, and international levels. As depicted in Fig. 47.1, Health Care Quality begins with the

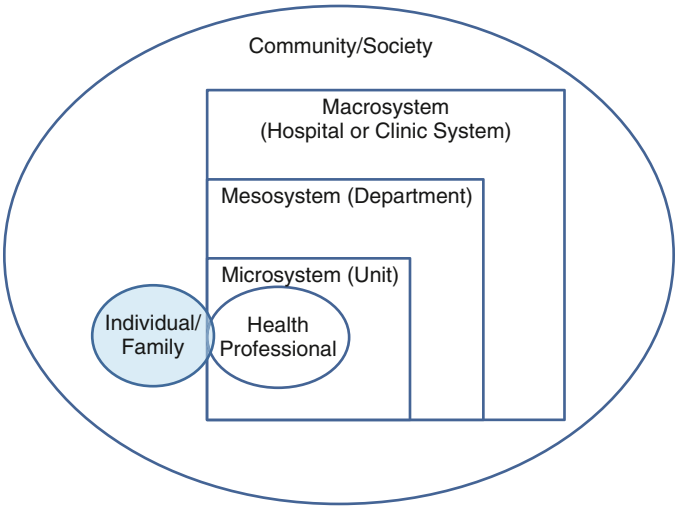

FIG. 47.1 Scope of Concept: Health Care Quality From a Systems Perspective.

individual patient and family. The patient is the focus of healthcare services, and their direct interaction is with professionals in clinics or nursing units. The patient's health is affected by their socioeconomic status and educational and work opportunities, as well as environmental factors. The patient's behavior and cultural preferences also affect their health and well-being. The patient comes to the healthcare system with these environmental, socioeconomic, and behavioral attributes that affect the care needed.

The first part of the system that the patient interacts with is usually a primary care clinic or hospital unit. These clinics or nursing units are sometimes called microsystems which are a small group of professionals who work together on a regular basis to provide care to discrete populations of patients.[5] These microsystems are responsible for monitoring their processes and outcomes of care and taking steps to improve things that are not working well. These microsystems are embedded in departments or mesosystems and larger organizations known as macrosystems. The meso- and macrosystems provide administrative support functions such as personnel services, product and supply acquisition, and other managerial functions. The leaders at these higher levels are accountable to regulatory agencies, stakeholders, and the community for the quality of care at their organizations. Leaders should role model the importance of everyone's attention to quality and safety as well as ensure that clinical staff have resources needed to provide high-quality care. Within the larger society, healthcare quality is affected by policies and legislation that facilitates access and quality and finds appropriate mechanisms to pay for care. People at all levels of the healthcare system must be engaged in ongoing efforts to improve quality.

ATTRIBUTES AND CRITERIA

In *Crossing the Quality Chasm,* the IOM (now known as the National Academy of Medicine) identified six characteristics or attributes for quality health care that are widely used as the basis for quality assessment and measurement: safe, timely, effective, efficient, equitable, and patient-centered. This is often referred to as the STEEEP healthcare principles or aims (Box 47.1).[4]

BOX 47.1 ATTRIBUTES OF HEALTH CARE QUALITY

- Safe
- Timely
- Effective
- Efficient
- Equitable
- Patient-Centered

Safe

All patients should expect care to be delivered without error and free of injury.[4] Unfortunately, thousands of errors occur every day in the U.S. health system from seemingly minor incidents such as not completing ambulation orders to administering the wrong medication that leads to patient death.[2] Safe healthcare delivery requires competent clinicians who demonstrate appropriate knowledge of the health/illness status of the patients they are treating and practice within the appropriate scope of practice based on their licensure or certification. Furthermore, safe healthcare delivery requires interprofessional teamwork and collaboration at all levels of the organization.

Timely

Timeliness of care refers to reducing wait time for healthcare delivery services. This principle is particularly important to avoid harmful delays that can occur with certain medical conditions. There are many delays in the healthcare system. Patients wait for parking, they wait in the clinic to register, they wait to be put in a room, and they wait to be seen by the healthcare provider. If they need diagnostic testing, to fill a prescription, or to see a physical therapist, they will probably wait again. Professionals may also have to wait. For example, they may wait for lab test results to make decisions for the plan of care. When health care is delivered in a timely manner, wait times and harmful delays for both the patient and the provider of care are reduced and care is offered before unnecessary complications occur.[4]

Effective

Effective health care is care based on offering evidence-based services that address the most important healthcare concerns to individuals and the most vulnerable population groups. Effective care involves integration of curative and preventative services and refraining from providing services to those who are not likely to benefit. In other words, effective care avoids underuse and overuse of healthcare services.[4]

Efficient

Efficiency in healthcare delivery refers to avoiding waste of resources for care delivery, such as time, cost, supplies, and even treatment. Using a standard process and products for securing IV catheters instead of letting every nurse pick their own products can save money and time. On a larger scale, care

coordination for patients with chronic conditions can reduce redundancy in diagnostic tests, prevent unnecessary hospitalizations, and improve the patient's quality of life. Efficiency reduces waste and improves value in the healthcare system.[4]

Equitable

Equitable care is providing care that does not vary in quality because of gender, ethnicity, geographic location, and socioeconomic status.[4] Equitable care serves people with limited resources with the same essential treatment options that people with more personal resources have available to them.

Patient-Centered Care

Patient-centered care is responsive to individual patient preferences, needs, and values. These considerations guide all clinical decisions. It also means treating patients with respect and dignity. Patient-centered care requires partnering with the patient and his or her family in every aspect of care.[4] Person-centered care, a similar concept, is presented in this book as Concept 41.

THEORETICAL LINKS

Avedis Donabedian's quality assessment model has been the predominant theoretical framework for Health Care Quality research and improvement for more than 50 years. Evaluation of the quality of care requires looking at the structures of care, the processes of care, and the outcomes of care.[6] According to Donabedian, *structure* is the characteristics of the settings in which the care is delivered. *Process* is the health care provided and includes both the technical aspects of care and the interpersonal aspects of care, and a health *outcome* is the effect of care on the health status of individuals or populations.[7] The Structure-Process-Outcome model identifies ways to define, categorize, and measure quality, which is increasingly important with the focus on the value of healthcare services. The model is depicted in Fig. 47.2 with an example of how it might be used to assess the quality of a nurse-managed collaborative care clinic.

Structure

Structure is defined as the characteristics of settings in which care is delivered. These include the facility characteristics such as size, governance and management structure, equipment, supplies, staff, provider knowledge and attitudes, and other contextual characteristics. Structure affects both processes and outcomes of care. For example, if a school of nursing decides to open a nurse-managed clinic for uninsured patients with diabetes, resources such clinic space, administrative support, equipment, and supplies must be identified as well as determining how the clinic will be staffed. Without these basic resources, the clinic cannot operate.

Process

Process is the health care provided as well as support functions and includes the services offered, the technical quality of the services (i.e., the staff and providers perform the technical aspects of the task or job), the quality of interpersonal interactions, and the adequacy of patient education, access, safety, and promotion of continuity of care (i.e., appropriate referral and follow-up). Donabedian suggested that the processes of care should be the primary focus of quality assessment.[8] In our example of a nurse-managed clinic, there are many interdependent processes including, but not limited to, registration, triage, and the episode of care with the provider. Developing a new process to help uninsured patients obtain free or low-cost diabetes medications and supplies can directly affect patient outcomes.

Outcomes

Outcomes are the end results of an encounter with the healthcare system and are affected by both the processes of care and structures of care. For example, if no primary care providers, clinics, or hospitals are located in a rural area, the people who live in the area may have undiagnosed and treated hypertension, diabetes, and other chronic conditions. The most commonly tracked outcomes are mortality, morbidity, functional status, disease, patient experience, and costs. In our example of

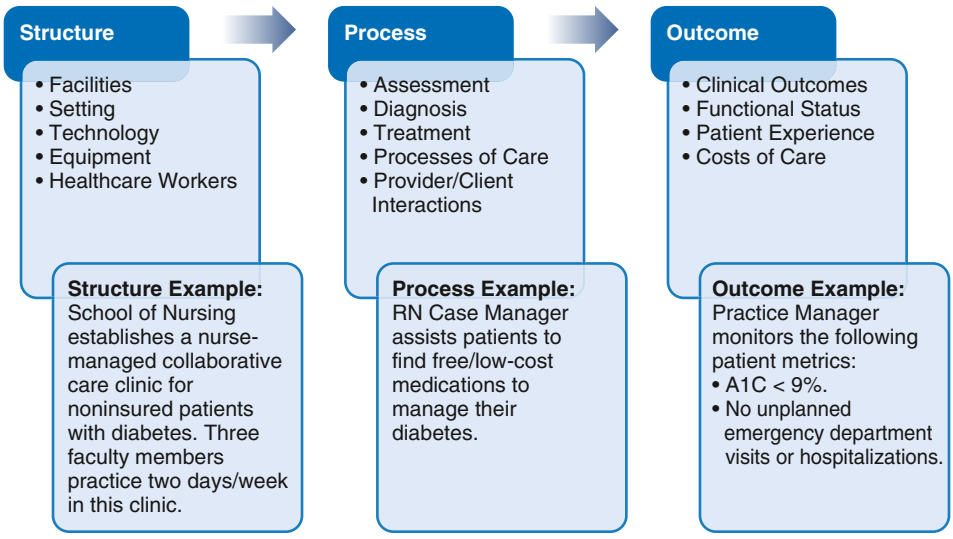
Structure
• Facilities
• Setting
• Technology
• Equipment
• Healthcare Workers
Structure Example: School of Nursing establishes a nurse-managed collaborative care clinic for noninsured patients with diabetes. Three faculty members practice two days/week in this clinic.
Process
• Assessment
• Diagnosis
• Treatment
• Processes of Care
• Provider/Client Interactions
Process Example: RN Case Manager assists patients to find free/low-cost medications to manage their diabetes.
Outcome
• Clinical Outcomes
• Functional Status
• Patient Experience
• Costs of Care
Outcome Example: Practice Manager monitors the following patient metrics:
• A1C < 9%.
• No unplanned emergency department visits or hospitalizations.

FIG. 47.2 Donabedian Model of Structure-Process-Outcome.

a nurse-managed clinic, the outcomes of interest may be hemoglobin A1C values less than 9% or unplanned emergency room visits or hospitalizations related to diabetes. These outcomes are important for the health and well-being of the patients, but they also help the clinicians evaluate the effectiveness of the care they are providing.

CORE COMPETENCIES

Health Care Quality

- Evaluate outcomes of care.
- Consider the socioeconomic effect of the delivery of health care.
- Integrate best evidence into nursing practice.
- Apply quality improvement principles in care delivery.
- Contribute to a culture of patient safety.
- Perform effectively in different team roles, using principles and values of team dynamics.
- Optimize system effectiveness through application of innovation and evidence-based practice.
- Use information and communication technology to gather data, create information, and generate knowledge.
- Comply with relevant laws, policies, and regulations.
- Use information and communication technologies and informatics processes to deliver safe nursing care to diverse populations in a variety of settings.

CONTEXT TO NURSING AND HEALTH CARE

Quality is a component of almost every aspect of healthcare services. In the United States, healthcare services are provided in a variety of for-profit or not-for-profit private entities and public systems. Reimbursement for services also varies based on the patient's insurance status. This patchwork of services and reimbursement makes it difficult to systematically improve the quality of care, despite concentrated efforts over the last two decades to improve quality.[9] As part of the Patient Protection and Affordable Care Act (ACA) 2010, a National Quality Strategy was developed to improve the delivery of healthcare services, patient outcomes, and population health.[10] More than 300 organizations had input into the first plan that laid out three aims commonly known as the Triple Aim.[10]

- Better Care: Improve the overall quality by making health care more patient-centered, reliable, accessible, and safe.
- Healthy People/Healthy Communities: Improve the health of the U.S. population by supporting proven interventions to address behavioral, social, and environmental determinants of health in addition to delivering higher-quality care.
- Affordable Care: Reduce the cost of quality health care for individuals, families, employers, and government.

There are many laws and regulations that govern how healthcare organizations operate, and many are directly related to ensuring the quality of care provided in the organization. System leaders are responsible for providing the resources and creating the work environment that allows healthcare workers to deliver high-quality care. All healthcare providers are responsible for delivering safe, effective, efficient, patient-centered care. Nurses are the front-line defense against actual and potential risks to patients. This requires an understanding of, and willingness to participate in, activities that promote and ensure high-quality patient care. Individual nurses have to go beyond just providing care based on the organization's policies and procedures. Nurses need to identify unsafe practices and respond appropriately to ensure a safe outcome for patients, themselves, and others. Nurses also need to understand the outcomes of care on their unit. For example, a nurse may ask: Does my medical unit have a higher number of falls than other medical units? If so, what does the evidence suggest we can do to reduce the number of falls on our unit? Finally, all nurses must be lifelong learners to keep up with current available knowledge related to the patient population they work with. The critical effect of healthcare professionals' work on patient quality and safety has been recognized in the last decade by identifying another aim to optimize health system performance. This fourth aim is identified as care of the provider/clinician with the goal of improving the work life of all those working in health care.[11]

Regulatory Agencies

Multiple oversight bodies and regulatory agencies exist to ensure the safety of the public. These regulatory agencies license healthcare facilities for operation (e.g., specific state licensing regulations) and can fine organizations or restrict services and suspend operations if there is a failure to meet expected standards. For example, hospitals can lose accreditation status, and Medicare or Medicaid reimbursement can be withheld if the delivery of patient care does not meet national quality standards.

The Centers for Medicare & Medicaid Services (CMS), part of the Department of Health and Human Services, is a key government entity with a large effect on healthcare quality.[12] More than one-third of the U.S. population get their health insurance through Medicare, Medicaid, or other public insurance.[13] Because of the size of the population covered as well as the need for fiscal responsibility with tax dollars, CMS has been leading efforts to link reimbursement to improved quality. One initiative is value-based purchasing (VBP), which links incentive payments to hospital quality.[14] Hospital quality is assessed through measures of mortality outcomes for specific diseases (e.g., heart failure and pneumonia), selected clinical process of care measures (e.g., catheter-associated urinary tract infection), and patient experience scores (e.g., HCAHPS Communication with Nurses).[14] The quality of nursing care directly affects most of the measures used by the VBP program and whether or not the hospital loses reimbursement dollars for low performance or gains financial incentives for exemplary performance.

Other public agencies that regulate care provided in hospitals and in community-based settings include the Occupational Safety and Health Administration (OSHA), the Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), the U.S. Department of Justice (DOJ), and the U.S. Drug Enforcement Administration (DEA). Many state and local public agencies also regulate care as well as health professions. Nurses are directly overseen by the Board of Nursing; nurses must maintain current license and practice by the standards set within the state.

Advisory Bodies

Advisory bodies have an important role in influencing standards for the delivery of quality health care. Although the focus of various advisory bodies varies, contributions to quality health care include efforts such as studies and recommendations regarding best practices for the improvement of health care, establishment of healthcare performance measures, provision of data on care and outcomes, and collaborative learning efforts.

One of the most influential advisory bodies is the National Academy of Medicine (NAM), formerly known as the IOM. The NAM is an independent, nonprofit organization that conducts studies and provides unbiased and authoritative advice to improve the nation's health.[15] Many of the studies that NAM undertakes begin as specific mandates from Congress, whereas others are requested by federal agencies and independent organizations. Examples of landmark studies that have directly influenced healthcare quality include *To Err Is Human: Building a Safer Health System,*[16] *Crossing the Quality Chasm: A New Health System for the 21st Century,*[4] and *Keeping Patients Safe: Transforming the Work Environment of Nurses.*[17] Other advisory groups include the American Nurses Association (ANA), the Institute for Healthcare Improvement (IHI), and the National Quality Forum (NQF).

Science of Improvement

There is wide variation in the healthcare services provided and the cost of care across the United States.[18] This variation includes situations in which evidence-based interventions are not consistently provided, may be used at a variable rate related to differences in professional opinion, or may be overused because of excessive supply and demand.[18] Reducing unnecessary variation is at the core of improvement work. Quality improvement (QI) is a data-driven, formal approach to the analysis of performance and the systematic efforts to improve outcomes and processes.[19] QI methods and tools originated in the Western Electric Company in the 1920s by Walter Shewhart and were advanced and spread by W. Edwards Deming after World War II in postwar Japan. In the 1980s, American industries recognized the value of continuous QI techniques, and Deming's ideas began to take hold in the U.S. Healthcare systems soon began looking at these ideas to improve their own processes. While there was initial skepticism about the relevance of using manufacturing tools in the complex healthcare environment, there is a growing body of knowledge about improvement science.[20] Today health professions' education accreditation standards expect schools to expose students to improvement methods, and many federal funding programs also expect improvement methods are used to support the work proposed by those seeking funding.

There are four key principles of successful QI: understand the systems and processes, focus on the customers (patients), build the teams, and use data to drive decision making.[21] Data are critical in QI activities and can be quantitative or qualitative or both. Data are used to describe how well current systems are working (baseline performance), what happens when changes are applied (did the change lead to improvement), and to document successful performance and allow comparison across sites.[21]

QI programs and methods vary across healthcare organizations, and include Continuous Quality Improvement (CQI), Six Sigma (DMAIC), Lean (The Toyota Production System), and the Model for Improvement. The Model for Improvement is the most common framework for organizational QI because of its relative simplicity. In this model, the QI team must address three questions:

1. *"What are we trying to accomplish?"* (Create an aim statement or goal for the educational improvement effort.)
2. *"How will we know a change is an improvement?"* (Identify measures that determine whether the change led to improvement.)
3. *"What change can we make that will result in improvement?"* (Identify and test changes in the current process that may lead to improvement.)

Once aim(s), measure(s), and tests of change have been identified, the QI team engages in a series of learning cycles known as Plan-Do-Study-Act (PDSA) cycles (Fig. 47.3). PDSA cycles examine whether or not a proposed test of change actually results in the desired outcome. PDSA cycles are ideally

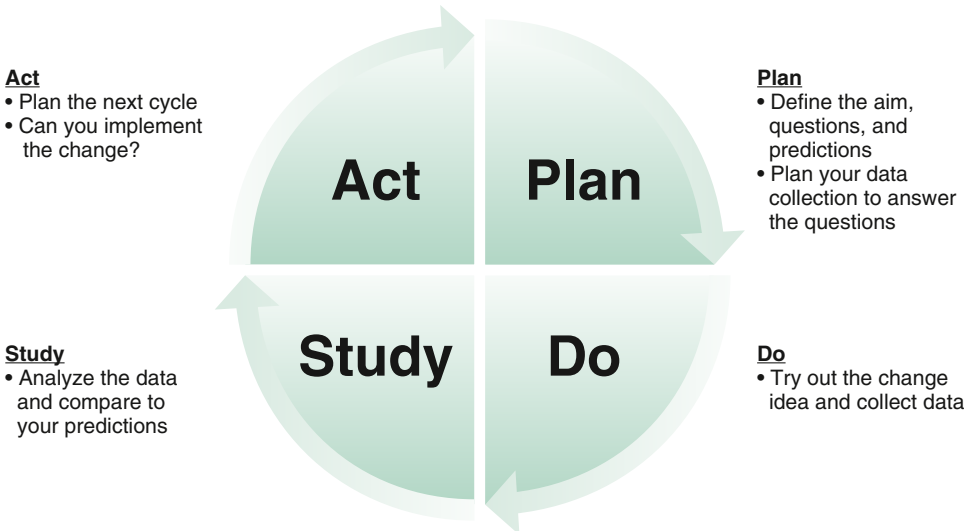

FIG. 47.3 Plan-Do-Study-Act.

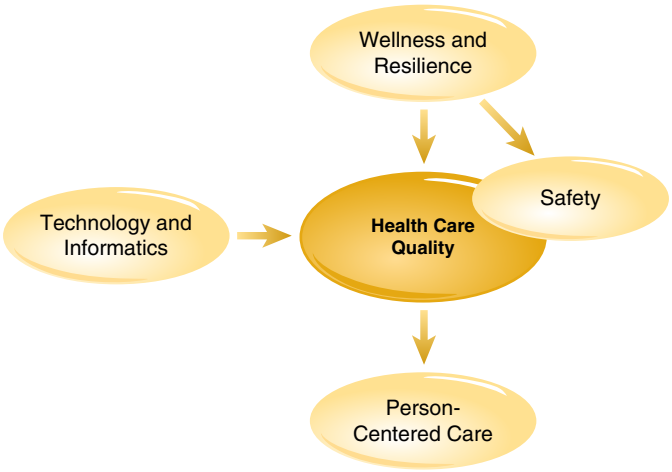

FIG. 47.4 Health Care Quality and Interrelated Concepts.

implemented on a small scale, often in rapid succession, and over a short period of time.[21-23] These types of QI activities are common in practice settings, and each professional is expected to participate on improvement teams at all levels of high-performing healthcare organizations.

INTERRELATED CONCEPTS

Health Care Quality has close relationships with most concepts featured in this textbook, including most in Section 3: Professional Nursing and Health Care Concepts. Knowing this, the intent is to then highlight four concepts with a particularly important relationship. First, all **Safety** is one of the key attributes of Health Care Quality and focuses on preventing patient harm. The promotion of patient safety and avoidance of error leading to harm requires a commitment to quality. A universal commitment to **Person-Centered Care** requires the integration of healthcare quality. **Technology and Informatics** provides tools and systems necessary to deliver quality health care and track outcomes. **Wellness and Resilience** as an interrelated concept acknowledging that healthcare worker well-being is critical to high-quality health care has been recognized by adding a fourth aim to the overall aim of the health system. These interrelationships are depicted in Fig. 47.4.

CLINICAL EXEMPLARS

In the United States, nurses can expect to encounter Health Care Quality in any setting and whenever they interact with a patient. Nurses will encounter regulations and standards that their healthcare organization must meet along with nurse-sensitive indicators for which they are personally responsible. A sample of exemplars, based on categories previously described, is listed in Box 47.2. It is beyond the scope of this text to describe all these in detail, but several are briefly presented next.

Featured Exemplars

The Joint Commission

The Joint Commission (TJC) is an independent, not-for-profit organization that develops standards for quality and safety and evaluates organizations based on these standards.[22] After CMS, this organization has the second greatest influence on healthcare quality in the United States. Healthcare organizations that want to participate in and receive payment from the Medicare or Medicaid programs must be certified as complying with the Conditions of Participation (CoPs), or standards, set forth in federal regulations. TJC is an approved accreditor for CMS Medicare certification. The TJC survey process includes an onsite survey focused on patient safety and quality and evaluates actual care processes and technology for the purpose of evaluating the organization's compliance with standards. The surveyors also provide guidance to help staff improve the organization's performance.[22] TJC accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards.

Agency for Healthcare Research and Quality

The Agency for Healthcare Research and Quality (AHRQ) is the lead federal agency charged with improving the safety and quality of the healthcare system.[23] AHRQ is the primary funder of health services research to understand how to make care safer and improve quality. One example is the Re-Engineered

BOX 47.2 EXEMPLARS OF HEALTH CARE QUALITY

Regulatory Agencies
- Centers for Medicare and Medicaid Services (CMS)
- The Joint Commission (TJC)
- U.S. Food and Drug Administration (FDA)
- Centers for Disease Control and Prevention (CDC)
- Occupational Safety and Health Administration (OSHA)
- National Committee for Quality Assurance (NCQA)
- State Boards of Nursing and other state level professional boards

Advisory Bodies
- American Nurses Association (ANA)
- Agency for Healthcare Research and Quality (AHRQ)
- National Academy of Medicine (NAM)
- Institute for Healthcare Improvement (IHI)
- National Quality Forum (NQF)

Quality Frameworks and Methods
- Baldrige
- ANCC Magnet designation
- Quality Improvement
- Plan-do-study-act (PDSA)
- Model for Improvement
- Lean Six Sigma

Point of Care
- CMS Value-Based Purchasing
- Patient Experience (CAHPS surveys)
- Hospital-Acquired Conditions (HAC)
  - Pressure Ulcers stage III and IV
  - Falls with Injury
  - Catheter-Associated Urinary Tract Infection (CAUTI)
  - Central Line-Associated Bloodstream Infection (CLABSI)

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Discharge (RED) project to help hospitals improve their discharge processes to reduce unnecessary readmissions.[24] AHRQ also creates materials and training programs to help professionals put research into practice. AHRQ worked with the Department of Defense to create the TeamSTEPPS program designed to improve teamwork skills and communication among healthcare professionals.[25] AHRQ also generates data used by providers and policymakers to improve care. An example of this work is the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) which is the primary survey used to assess the patients' experience of care in the hospital.[26]

The Institute for Healthcare Improvement

The IHI was founded in 1991 as a not-for-profit organization focused on redesigning healthcare organizations to reduce errors and wasted resources and decrease costs.[27] IHI first focused on spreading best practices through building improvement communities. IHI initiatives include the 5 Million Lives campaign aimed at reducing 5 million unnecessary deaths related to poor quality and safety. IHI also aims to build improvement capability by providing educational and consultative support to health professional schools and healthcare organizations. The IHI Open School offers over 30 web-based training courses on patient safety, QI, person-centered care, and other topics which are free to most students. More than 900,000 students and professionals have taken IHI Open School courses.[28]

The National Quality Forum

The NQF is a not-for-profit membership-based organization focused on meaningful quality measurement.[31] As an advisory body, NQF has been instrumental in advancing efforts to improve quality through performance measurement and public reporting. There are more than 430 member organizations including government agencies, professional organizations, healthcare systems, insurance companies, and other healthcare services entities. NQF has become the central repository for healthcare measures that are considered scientifically sound, have been standardized for use across facilities/settings, and are relevant to improving quality of care. Currently NQF has endorsed more than 500 measures.[31] Some of these measures are associated with the quality of nursing care including falls, falls with injury, pressure ulcer/injury, central line-associated bloodstream infection, and catheter-associated urinary tract infection.

CASE STUDY

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Case Presentation

An interprofessional team including staff nurses; nurse managers; physicians; a Wound, Ostomy, Continence Nurse (WOCN); a pharmacist; a dietician; a supply technician; and a quality management specialist were assigned to work on reducing hospital-acquired pressure injuries in their facility. They decided to review 50 random charts for pressure injury prevention interventions and 50 wound care consults. The data suggested that nurses were consulting WOCN frequently for incontinence-associated dermatitis (IAD) mistaking it for stage 1 pressure ulcers. The team decided to look more carefully at this problem in one medical intensive care unit. They used QI methods including observing the process and interviewing the staff and patients involved. They also collected data about the number of patients who had incontinence and who had redness in their perineal area; they found that 50% of patients with incontinence had redness in the perineal area. The team further investigated the current care processes for incontinence and found no standardized process for cleaning up an incontinent patient and no consistent product use to prevent dermatitis. The team searched the literature for the best evidence for skin care for incontinent patients. The evidence suggested that use of a cleanser, moisturizer, and skin barrier would reduce IAD.

For the first PDSA cycle, the team implemented a protocol based on the three products (cleanser, moisturizer, and skin barrier) available at the hospital. While the nurses were willing to try this protocol, it was soon clear that the new process was cumbersome and time-consuming for nurses to use because the products came in multiuse bottles stored in the medication room and took too many steps to complete.

For the second PDSA cycle, the team implemented a protocol based on one product that incorporated all three elements in a single disposable wipe. The bulk of any solid waste was removed, and the nurse used one to three wipes to finish the cleansing process. The ongoing assessment during this cycle showed that nurses were satisfied with the product, and most patients did not develop IAD. Further time and motion studies showed that the new product saved money too. The use of the single disposable wipe was $0.95 cheaper than the use of the three multiuse bottles. Nursing time for cleaning up an incontinent patient with the wipes was also reduced by 4.5 minutes compared with the three products. Using a run chart with data plotted over time, team leaders presented the data from this improvement activity to the hospital administration, and the single product was approved for use across all adult nursing units in the hospital (Fig. 47.5).

Case Analysis Questions

1. What steps did this team take to understand the current process of caring for patients with incontinence?
2. What was the test of change in the first PDSA cycle? What did the team learn?
3. What change did the team test in the second PDSA cycle? Did it work?

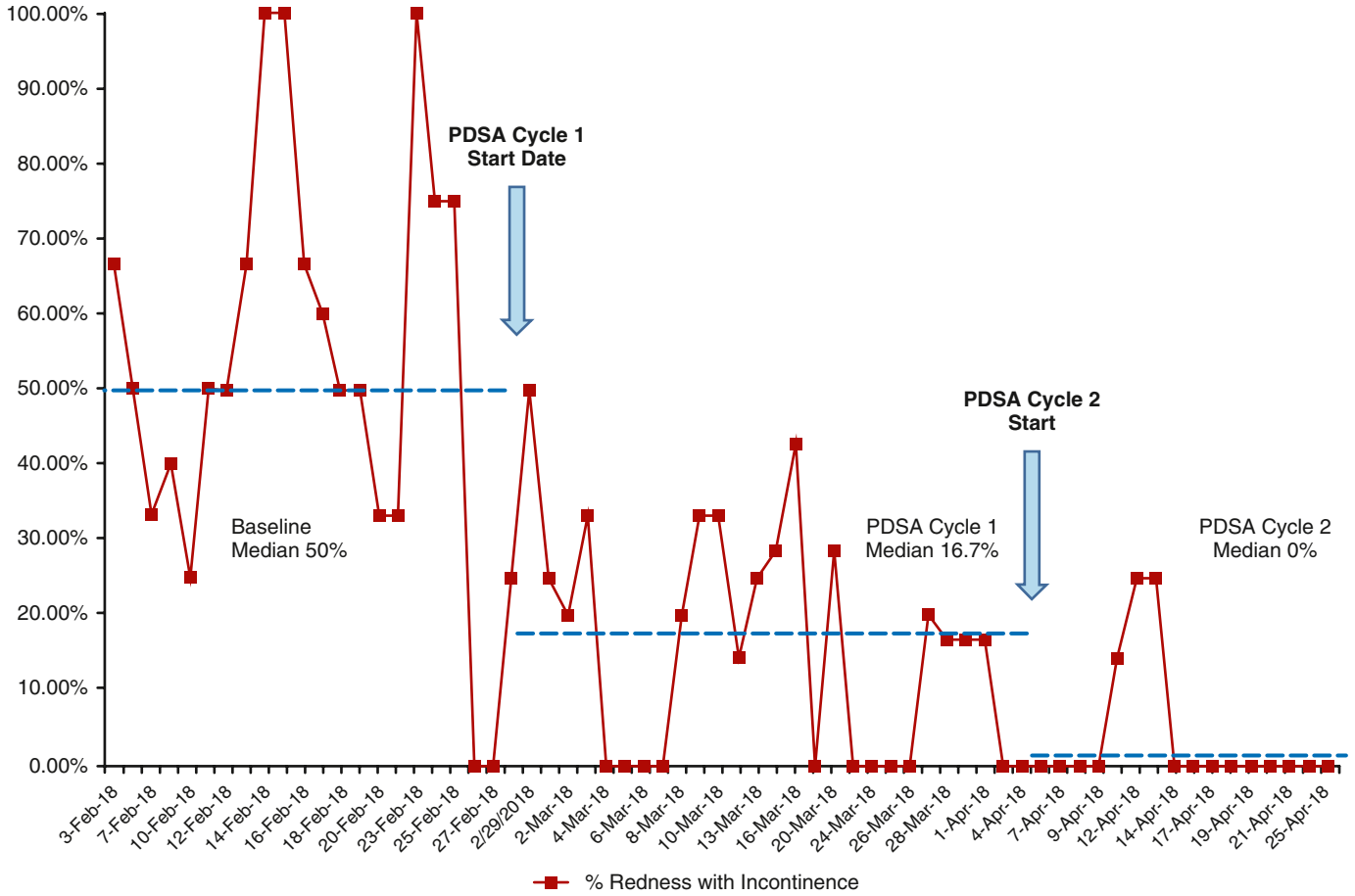

FIG. 47.5 Medical Intensive Care Unit Incontinence Associate Dermatitis (IAD) Improvement Project: % of patients with IAD. *PDSA,* Plan-Do-Study-Act.

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CONCEPT 48

Technology and Informatics

Jennie C. De Gagne

Healthcare providers have always used patient data and information to provide the best care possible, but the introduction of technology to gather, process, and manage data and information transformed the landscape of care and created both new opportunities and obligations. As the advent of new healthcare technologies made information technology (IT) essential for the provision of safe, effective, efficient, and quality care, healthcare professionals with expertise and experience in computer and information science became focused on furthering and broadening their specialty area of practice with a new and rapidly advancing discipline called informatics. Reliance on informatics in health care is becoming ubiquitous, and practicing nurses, nurse educators, nurse researchers, and nurse administrators are increasingly required to meet expected competencies in informatics, although many do not fully understand the meaning of the term.

DEFINITION

Technology describes the knowledge and use of tools, machines, materials, and processes to help solve human problems. It can be applied to specific disciplines (e.g., educational technologies, medical technologies, health technologies), and the focus herein is on *health information technology (health IT)* as the essential antecedent for health informatics. Currently, health informatics cannot exist without health IT.

Health IT describes an umbrella framework for the comprehensive management of health information and its secure exchange between consumers, providers, government and quality entities, and insurers. Health IT is generally viewed as the most promising tool for improving the overall quality, safety, and efficiency of the health delivery system.[1] The efficacy and effectiveness of health IT tools for engaging patients, their families, and caregivers in healthcare decisions continue to be examined.

Informatics is a broad term derived from the French word *informatique;* it describes the science involved in the fields of information science and computer science, which are focused on the process, management, and retrieval of information.[2] *Health informatics* as a discipline is concerned with the storage, analysis, and dissemination of health data through the application of information and communication technology (Box 48.1). Health informatics communities, such as the American Medical Informatics Association (AMIA), use the term *health informatics* to refer to the applied research and practice of informatics across clinical and public health domains.[3] As a broad term, health informatics includes the discipline of informatics as applied to biomedical research, clinical care, and public health.[3]

SCOPE

The scope of this concept is represented by the intersection of health IT and health informatics with the science of health to (1) provide powerful tools and processes for advancing health practices and (2) serve as an infrastructure to support and promote continuous learning in healthcare systems (Fig. 48.1).[4]

Health IT and informatics tools are comprised in the infrastructure of a healthcare delivery system and used by various groups, including consumers, patients, their families, caregivers, healthcare professionals, administrators, and any personnel involved in supporting the delivery of health care. One such tool is the electronic health record (EHR), a central component of the health IT infrastructure. An EHR is an individual's official digital health record that can be shared among multiple facilities and agencies. Other tools for patients, their families and caregivers, and consumers include mobile health tools such as wearable devices (e.g., Fitbit and Apple Watch), personal health records, patient portals, physiologic monitoring (e.g., pulse oximeter and electronic stethoscope), and sensor technologies. Additionally, infrastructure health information technologies such as health information exchanges (HIEs) support the sharing of health data across healthcare institutions, data warehouses that are repositories of stored data, and communication networks. A plethora of health IT and informatics tools provide opportunities for engaging consumers in health care and creating a connected health system.

BOX 48.1 Informatics Definitions

- *Technology* is the knowledge and use of tools, machines, materials, and processes to help solve human problems.
- *Health information technology (health IT)* is the application of information processing involving both computer hardware and computer software that deals with the storage, retrieval, sharing, and use of healthcare data, information, and knowledge for communication and decision making.
- *Informatics* is derived from the French word *informatique.* Simply stated, informatics is the science that encompasses information science and computer science to study the process, management, and retrieval of information.
- *Health informatics* is a discipline in which health data are stored, analyzed, and disseminated through the application of information and communication technology.
- *Informatician* is a person who works in the field of informatics (sometimes called an informaticist).
- *Information science* is an interprofessional science primarily concerned with the analysis, collection, classification, manipulation, storage, retrieval, and dissemination of information.
- *Computer science* is a branch of engineering that studies computation and computer technology, hardware, and software as well as the theoretical foundations of information and computation techniques.

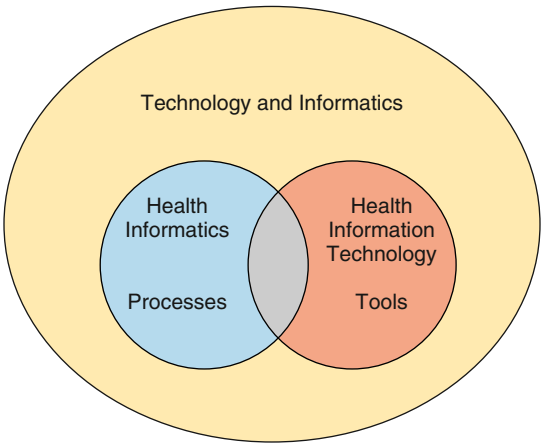

FIG. 48.1 Scope of Concept: Technology and Informatics.

ATTRIBUTES AND CRITERIA

Health IT is a precursor or antecedent to health informatics whose defining characteristics and consequences (summarized in Table 48.1) are reflected in the analysis of health informatics. A concept analysis of health IT and informatics suggests the following attributes: hardware and software, data standards and standardized terminology, policies and procedures, privacy and security, informatics workforce, and organizational skills.

Hardware and Software

Health IT is the application of information processing involving computer hardware, computer software, communications, and networking technologies that enable the storage, retrieval, sharing, and use of healthcare data, information, knowledge, and wisdom for communication and decision making.[2] Certified *clinical information systems (CISs)* offer the best set of tools for achieving quality outcomes and are at the heart of health IT and informatics. CISs consist of two key elements:

- *information technology applied at the point of clinical care*, including EHRs, clinical data repositories, decision support programs, handheld and mobile devices for collecting data and viewing reference material, and imaging modalities; and
- *collaborative communication between patients and providers* such as electronic messaging systems and patient portals. Increasingly, care is provided in multiple settings, thus creating a need for clinicians to share data with providers at other locations.

Advances in computer networking, broadband, and wireless communication technologies have made it possible for clinicians to access these data via any device, at any time, and from any location (e.g., the office, hospital, home, or when traveling out of town).

An increasing number of health information technology digital tools are being used by patients and their families, caregivers, and consumers. These digital tools include patient portals that allow secure messaging and are available on numerous devices (e.g., tablets, smartphones, and desktop or laptop computers) as well as mobile applications software that collects and shares patient-generated health data (PGHD) (e.g., daily glucose readings, food consumptions, and physical activities measures) with healthcare providers or other consumers. These mobile applications can be used to connect patients or consumers with social network groups. The use of these digital tools in the connected health world helps patients and families, caregivers, and consumers to manage their wellness and health conditions, especially chronic illnesses such as heart disease, stroke, and diabetes. Digital tools that collect PGHD may be used for personal management with the option for data to be shared with providers or kept private. Remote monitoring tools and sensor technologies allow healthcare providers to monitor patients in their homes.

Data Standards and Standardized Terminology

The proliferation of clinical information systems has created a pressing need for standardization of patient information systems and terminology. Standardized terminology within the EHR is critical for allowing an interprofessional team to communicate and exchange care and health information. The universal requirement for quality patient care, efficiency, and cost containment relies on a meaningful expression of data, information, and knowledge that can be shared effectively across disciplines and care settings.[2] EHRs must use consistent, codified terminology to eliminate ambiguity and ensure greater interoperability. The numerous ways of organizing data, information, and knowledge are built on taxonomies and nomenclature developed over decades using a clear coding scheme. The terminologies recognized by the American Nurses Association (ANA) are listed in Table 48.2.

Policies and Procedures

Responsibility for developing an overall policy infrastructure that supports health IT and health information exchanges lies primarily with the Office of the National Coordinator for Health IT (ONC). ONC has worked closely with the Centers for Medicare and Medicaid Services (CMS) to assist in establishing policies related to Medicare and Medicaid payment

TABLE 48.1 Health Information Technology Antecedents

Antecedent	Defining Characteristics	Outcomes
• Need for a tool, machine, materials, and/or processes to improve health care • Information science • Computer science • Health discipline science (e.g., nursing, medicine) • Information technology specialist • Informed patients, families, and caregivers	• Technology (hardware and software) that supports discipline of health informatics (e.g., electronic health record) • Clinical point-of-care tools • Interoperable and connected • Evolutionary and updated to provide new functionality • Interoperable systems and tools • Technology-competent and engaged patients, families, and caregivers	• Improves health provider's workflow • Improves healthcare quality • Prevents medical errors • Reduces healthcare costs • Increases administrative efficiencies • Decreases paperwork • Improves disease tracking • Creates cultural, social, organizational, and intellectual change • May be useful in unintended ways • Serves as an infrastructure for a learning health system • Promotes and supports patient and family engagement in health decisions • Connected health

TABLE 48.2 ANA-Recognized Terminologies

Terminology	Terminology URL	Nursing Process Within Terminology	Date Recognized by ANA
CCC: Clinical Care Classification	https://careclassification.org/framework/model	Diagnoses, interventions, and outcomes	1992
ICNP: International Classification of Nursing Practice	https://www.icn.ch/what-we-do/projectsprogrammes/ehealth	Diagnoses, interventions, and outcomes	2000
NANDA: NANDA International	http://www.nanda.org	Nursing diagnoses	1992
NIC: Nursing Interventions Classification	https://nursing.uiowa.edu/cncce/nursing-interventions-classification-overview	Interventions	1992
NOC: Nursing Outcomes Classification	https://nursing.uiowa.edu/cncce/nursing-outcomes-classification-overview	Outcome indicators	1997
Omaha System	http://www.omahasystem.org	Problem classification scheme, intervention scheme, and problem rating scale for outcomes	1992
PNDS: Perioperative Nursing Data Set	https://www.aorn.org/education/individuals/continuing-education/online-courses/introduction-to-pnds	Diagnoses, interventions, and outcomes	1999
SNOMED CT: Systematic Nomenclature of Medicine Clinical Terms	https://www.snomed.org/snomed-ct/five-step-briefing	Assessment concepts, diagnoses, interventions, and outcomes	1999

for "meaningful use" of EHRs. ONC rules specify standards, implementation specifications, and other certification criteria for EHR systems and technologies, whereas CMS rules specify how hospitals, physicians, and other eligible professionals must demonstrate their meaningful use of these technologies to receive Medicare and Medicaid payment incentives. These EHR incentive programs have been renamed as the Promoting Interoperability (PI) programs to better reflect patients' access to health information.[5]

In addition to meaningful use criteria and certification standards, the ONC health IT policy committee has issued recommendations regarding health information extension centers, workforce training, and privacy and security. Once the policies are established at the federal level, states, professional organizations, and institutions adopt and adapt these fundamental practices at the local level to reduce barriers to health information exchange.

Privacy and Security

A major concern with healthcare information, as with other highly sensitive personal data, is the need to protect privacy and security. The privacy and security rules issued under the Health Insurance Portability and Accountability Act (HIPAA) of 1996 combine with multiple state laws to create a complex network of regulations regarding patient privacy and consent for the use of identifiable personal health information. In 2013, HIPAA rules were modified to reflect new technologies and enhance the personalization and quality of health care.[6] Building and maintaining the public's trust in health IT will require an ongoing institution of comprehensive privacy and security protections

that enforce clear rules on how patient data can be accessed, used, and disclosed.

Informatics Workforce

An informatics workforce possessing an appropriate skill set is critical to the advancement of health IT and informatics. Over the past decade, in the nursing field and other disciplines, a great deal of effort has been aimed at defining informatics competencies; however, there is currently no single consolidated list of competencies. Several professional organizations such as the American Medical Informatics Association (AMIA) and the Health Information Management Systems Society (HIMSS) are working to identify informatics competencies. In nursing, the ANA has defined the scope and standards for informatics nurses and informatics nurse specialists.[7] In addition, the Quality and Safety Education for Nurses (QSEN)[8] initiative and American Association of Colleges of Nursing (AACN)[9] have documented the informatics competencies needed by nurses prepared at the prelicensure and graduate levels. In 2016, a European Union–United States collaboration on eHealth (i.e., EU*US eHealth Work Project) began to map the structure of and gaps in health IT skills and training needs globally.[10] As a result of these various initiatives, informatics competencies for all levels of nursing as well as for specialization as an informatics nurse or nurse specialist have been developed.

Informaticians are informatics specialists with advanced education and training who collaborate with other healthcare professionals and IT specialists to enhance and support patient-centered quality health care. Informaticians combine their knowledge of patient care with an understanding of informatics concepts, methods, and tools in order to analyze, design, implement, and evaluate information and communication systems that enhance individual and population health and provide efficient administrative services.[2] The hallmark of nursing informatics (NI) practice is its cross-disciplinary nature; nurse informaticians often lead teams to create practical informatics solutions for use by many disciplines.[7] For physicians, clinical informatics was recognized in 2011 in the United States as a board-certified medical subspecialty.[11] Nurses can become certified in nursing informatics through the American Nurses Credentialing Center (ANCC).

Peopleware and Organizational Skills

Informatics skills are not limited to a knowledge of hardware and software but include an understanding of people and organizational skills as well. Given the widespread use of health IT and informatics, technical skills alone are insufficient to ensure implementation success. Peopleware, a key component of successful implementation, is a term that refers to anything connected with the role of people in the development and use of computer hardware and software systems. Peopleware involves the sociologic side of informatics implementations and includes issues such as productivity, teamwork, group dynamics, project management, organizational factors, human interface design, and human-machine interactions. When new technologies are being introduced into an organization, peopleware issues can be as important—if not more important—than technological issues. Skillful management of people is crucial to the management of technological change.[2] Table 48.3 summarizes the concept analysis of health informatics and its effects on nursing practice and consumer and patient health.

THEORETICAL LINKS

Classic theories from information science and computer science underpin the concept of informatics. Cognitive science and organizational science also play a role in the implementation of informatics. Specialty areas of practice or domains of informatics are differentiated within specific disciplines of science (e.g., nursing science, medical science), which provide fundamental building blocks of related professional knowledge and wisdom.[2,7]

Information Science

Information science is a branch of applied mathematics and electrical engineering that involves the quantification of information. It is a collection of mathematical theories based on statistics, concerned with methods of coding, transmitting, storing, retrieving, and decoding information. Its application includes the design of systems, such as clinical information systems, that are involved with data transmission, encryption, compression, and other information processing techniques. Recent advances in health ITs and health information exchanges have resulted in an enormous increase in healthcare data, necessitating large storage capacities, powerful computing resources, and accurate data analysis algorithms. Every clinical decision is based on the availability of transmitted information. If the exchange of information works well, clinical care is solidly based on best evidence, whereas poor transmission of clinical data can lead to poorly informed decisions.[2]

Computer Science

Computer science comprises the study of both the theoretical foundations of information and computation and the practical aspects of the implementation and application of computer systems. It is frequently described as the systematic study of algorithmic processes that create, describe, and transform information. Computer science is a broad field of study that focuses on computation, algorithms and data structures, programming methodology and languages, and computer elements (hardware, software, and networks) and architecture. It also includes fields such as software engineering, artificial intelligence, computer networking and communications, database systems, and human-computer interaction.[12]

Cognitive Science

Cognitive science is the interprofessional study of mind, intelligence, and behavior from an information processing perspective. It encompasses how people think, understand, remember, synthesize, access, and respond to stored information and knowledge. Cognitive science provides the scaffolding for the analysis and modeling of complex human performance in technology-mediated settings. Theories derived from cognitive science inform and shape the design, development,

TABLE 48.3 Health Informatics Summary[a]

Antecedents	Defining Characteristics	Nurse Outcomes	Patient Outcomes
Certified health IT hardware and software (clinical information system and computer applications)	Interoperable electronic health record and tools that allow for formal representation of data/information/knowledge/wisdom	Clinical decision support tools at point of care, reduction in duplication of services, evidence-based practice, and opportunity for shared learning environment	Consumers adopt personal health record; decreased cost of health care; patient-centered, personalized health care; and user-generated data
Standard terminology for data collection and electronic exchange of health information	Data structure that allows for uniform input and retrieval of health data Algorithms that support evidence-based clinical decision making and provide safety checks	Mechanism to determine costs of nursing and other healthcare services; accurate, timely, and up-to-date information at point of care	Better understanding of healthcare benefits and services, improved quality of health care, and reduced medical errors
Policies for data transmission and use	Policy framework for development and adoption of health IT infrastructure and health information exchange	Ensures security and privacy of health information and exchange	Confidentiality of health data
Broadband capacity for widespread electronic data transmission and download	Sufficient bandwidth requirement to achieve full functionality of health IT applications	Ability to transfer health data among providers and across healthcare systems	Health data available at point of care
Persons with specialized education in informatics Persons with technical knowledge and skill	Informatics specialist as team member Health information management and health IT professionals as team members	Maximize use of clinical information system	
End users with basic informatics competencies and discipline-specific knowledge and wisdom	Clinicians (nurses) with knowledge of phenomena of nursing in their area of practice as a team member	Broad-based team approach to patient care to support clinical judgment and meaningful use	
Patient, families, and caregivers informed about health and healthcare decisions	Patient, families, and caregivers central to the healthcare team		Improved patient engagement
Organizational culture that supports a learning healthcare system	Dynamic, interprofessional, team-oriented digital culture focused on peopleware and organizational skills	Use of data to inform clinical care and support research and knowledge development	Improved patient education, self-management, and health literacy

[a]*Health informatics* is a discipline that sorts, enhances, processes, operates on, organizes, makes usable, and retrieves information related to human health and illness through the application of technology for the purpose of sharing data, information, knowledge, and wisdom among health providers and consumers, and across organizations.
IT, Information technology.

implementation, and assessment of health information systems. The human mind is frequently compared with a computer, and experts in cognitive science try to model human thinking using the artificial networks of the computer.[2]

Organizational Science

Organizational science is an emerging field focused on the behavior of organizations; it comprises a wide variety of topics such as individual, group, and organizational decision making; the management of human resources; and the design of organizations and interorganizational networks. The successful implementation of health IT and health informatics within and among organizations requires comprehensive knowledge of the organizations involved and how they are affected by culture, behavior, and social change.[13] Health care is a complex adaptive system that depends on the involvement of patients, providers, and policymakers to ensure that every healthcare decision is guided by timely, accurate, and comprehensive health information so that the provision of all care is timely, efficient, equitable, and patient-centered. Informatics specialists who possess the knowledge and skills required to analyze organizational culture, plan change within the organization, build and work in interprofessional teams, and lead information system development and implementation are key resources for an organization. Changes in culture can be critical to convincing and training healthcare professionals and healthcare systems to embrace informatics and other emerging technologies and use them meaningfully.[2]

CORE COMPETENCIES

Technology and Informatics

- Identify essential knowledge and skills required to address individual patient, family, or community needs related to information technology and informatics.
- Apply appropriate and effective management tools to support clinical decision making, care coordination, and error protection related to the use of technology and informatics.
- Use technology and informatics to plan, implement and evaluate the plan of care to diverse populations in a variety of settings.
- Engage in ongoing learning and opportunities to enhance individual and population health and provide efficient administrative services as it relates to technology and informatics.
- Use technology and informatics to support communication and interprofessional teamwork.
- Apply ethical, legal, professional, regulatory standards, and workplace policies in the application of informatics within health care.

CONTEXT TO NURSING AND HEALTH CARE

Informatics inform nurses' professional and interprofessional roles and responsibilities within healthcare institutions. Knowledge of the evolution of health informatics and the domains of informatics is helpful to appreciate their specific applications in nursing.

Historical Perspective: The Evolution of Technology and Informatics in Health Care

One could argue that ideas about informatics date back more than 150 years (Fig. 48.2). Various health ITs have been available since the 1970s; however, support for the widespread use of information and communication technologies is a more recent occurrence. Over the past decade, a convergence of driving forces has served as a major catalyst to move the healthcare informatics agenda forward and ensure that all healthcare professionals have the necessary "*21st century knowledge and skills for practice in a complex, emerging technologically sophisticated, consumer-centric, global environment.*"[14] The Institute of Medicine has consistently highlighted the use of health ITs as one solution for ensuring safe and quality health care. In 2000 in *To Err Is Human: Building a Better Health System,*[15] it recommended using appropriate technologies as one solution to reduce errors and ensure patient safety. Its 2001 report, *Crossing the Quality Chasm,* contained a general consensus that the current healthcare system was in need of reform, which could be achieved only through the "*effective use of information technologies to automate clinical information and make it readily accessible to patients and all members of the care team.*"[16] This report advised that "*an improved information infrastructure is needed to establish effective and timely communication among clinicians and between patients and clinicians,*"[16] thus highlighting the need for a meaningful use of EHRs, tools, and patient portals to foster communication between patients and clinicians and a transformation in health professional education. A 2013 Institute of Medicine report entitled *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*[4] advocated for an informatics infrastructure in support of the Institute's earlier recommendation for the development of a learning healthcare system that "*generates and applies the best evidence for the collaborative healthcare choices of each patient and provider; drives the process of discovery as a natural outgrowth of patient care; and ensures innovation, quality, safety, and value in health care.*"[17]

In 2009, the American Recovery and Reinvestment Act authorized the CMS to provide a reimbursement incentive for physician and hospital providers to become "meaningful users" of an EHR.[5] This act made the adoption of EHRs and other initiatives, such as meaningful use, of paramount importance and served as a catalyst for the current use of EHRs by providers in hospitals and clinics.

The Federal Health Information Technology Strategic Plan 2020–2025 envisions "*a health system that uses information to engage individuals, lower costs, deliver high quality care, and improve individual and population health,*" and describes its mission to "*improve the health and well-being of individuals and communities [by] using technology and health information that is accessible when and where it matters most.*"[18]

It is interesting that the increased use of digital technology in society is driving the integration of technology in health care. The Pew Research Center has noted three revolutionary technology occurrences since 2002[19] that have had a tremendous effect on patients and their families, caregivers, and healthcare providers:

1. Greater access to broadband, which increased access to the Internet and promoted its use in various facets of people's lives;
2. Mobile connectivity and the concept of any time–anywhere access; and
3. The presence of social media and social networks in daily life.

As a result of these changes, increasingly more adults are using digital tools to access health information, manage their own health data, and participate more actively in their health care.

"In attempting to arrive at the truth, I have applied everywhere for information, but in scarcely an instance have I been able to obtain hospital records fit for any purposes of comparison. If they could be obtained they would enable us to decide many other questions besides the ones alluded to. They would show the subscribers how their money was being spent, what amount of good was really being done with it, or whether the money was not doing mischief rather than good." Florence Nightingale (1863).

Longman, Roberts and Green: *Notes on Hospitals*, 1863, London, p. 176

FIG. 48.2 The First Nurse Informatician.

Domains of Informatics

Health informatics is evolving as a discipline, and its definition and standards are a work in progress. Although there is currently no universally accepted taxonomy for the major domains of informatics, this concept presentation uses AMIA's five domains of informatics: translational bioinformatics, clinical research informatics, clinical informatics, consumer health informatics, and public health informatics.[3] These domains are not exclusive and variously overlap.[3] All domains integrate computer science and information science to manage and communicate data, information, and knowledge; however, they differ in their integration of discipline-specific science and discipline-specific practice. The field of informatics has recently grown to reflect the substantive contributions of various health disciplines to the generation and use of healthcare data and related information, which has helped to differentiate the often-confusing terminology. The following discussion defines each domain and describes major subtypes when applicable.

Translational Bioinformatics

AMIA refers to translational bioinformatics as the development of storage, analytic, and interpretive methods to optimize the transformation of increasingly voluminous biomedical and genomic data into proactive, predictive, preventive, and participatory health.[3] Translational bioinformatics is evolving with the support of the National Institutes of Health's road map for medical research,[3] and its integrative efforts are producing new knowledge that can be disseminated to a variety of stakeholders, including patients, clinicians, and biomedical scientists.

Clinical Research Informatics

Clinical research informatics describes an area of informatics devoted to advancing the biomedical/health sciences through the humane and ethical use of informatics. Pertinent issues in this area relate to the use of information and knowledge, and the sound and socially appropriate collection and maintenance of person-specific and/or deidentified patient data. EHRs will continue to enhance the availability of clinical data for research and quality improvement initiatives.

Clinical Informatics

Clinical informatics (also referred to as applied clinical informatics or operational informatics) is the application of information and communication technologies to the delivery of healthcare services. Despite some variations, informatics is essentially the same when used in healthcare delivery regardless of the health professional groups or type of providers involved (e.g., dentists, pharmacists, physicians, nurses). Clinical informatics is concerned with the use of information in health care by clinicians and includes wide-ranging topics and issues such as clinical decision support; digital images commonly used in radiology, pathology, dermatology, and ophthalmology; clinical documentation; computerized provider order entry (CPOE) systems; system design; and system implementation and adoption.

Consumer Health Informatics

Consumer health informatics (CHI) is a form of health IT geared toward delivering better healthcare decisions based on the consumer's perspective.[3] It is well recognized that consumer informatics, perhaps the most challenging and rapidly expanding field in health informatics, is positioned at the crossroads of other disciplines such as nursing informatics (NI), public health, health promotion, health education, library science, and communication science. NI is the specialty that integrates nursing science with multiple information and analytical sciences to identify, define, manage, and communicate data, information, knowledge, and wisdom in nursing practice.[7] NI supports consumers, patients, nurses, and other providers in their decision making in all roles and settings. This support is accomplished through the use of "information structures, information processes, and information technology."[7] CHI is paving the way for health care in an age of connected health through the inclusion of technologies that focus on patients as the primary users of health information.[2]

Public Health Informatics

Public health informatics and its corollary, population informatics, involve the application of information, computer science, and technology to public health science to improve the health of populations. Application of the principles and practices of public health informatics leads to new tools and methodologies that enable the development and use of interoperable information systems for public health functions such as biosurveillance, outbreak response, and electronic laboratory reporting.

Informatics in Nursing Practice

Nurses use various health IT tools to support their clinical practice. EHRs are the most common tool and are more inclusive of the clinical data and information collected on a patient by numerous healthcare professionals to facilitate clinical decision making. Within EHRs, nurses use nursing documentation systems to record the process and outcomes of their care. To facilitate the provision of care, EHRs incorporate evidence-based practice guidelines and alerts to help nurses conduct assessments, diagnose, and determine nursing interventions to achieve optimal patient outcomes.[2]

With the introduction of meaningful use criteria, EHRs are becoming accessible to patients and their families, caregivers, and consumers, enabling them to become part of the interprofessional team and engage in healthcare decision making. The engagement of patients in their health care is not a new concept, but in recent years, health ITs have provided patients with the tools needed to engage by making health information and patient records more accessible. Accessing social media sites, patient portals, and mobile health devices are all ways that engaged patients can participate in their health care.[3]

In the future, health IT and informatics will continue to enable the transformation of health care. The widespread and meaningful use of fully functional EHR systems, combined with a robust infrastructure for broad-based health information exchange, has the potential to improve the quality, safety, and efficiency of health care for all Americans. As more organizations adopt EHRs, healthcare professionals will have greater access to patient information, allowing faster and more accurate diagnoses and treatment. Patients will have access to their own information and the choice to share it securely over the Internet with family members, thus allowing better coordination of care for themselves and their loved ones. EHRs are becoming increasingly widespread across the healthcare system because of their efficiency in disseminating knowledge and promoting safe patient care. Health ITs, network connectivity, and an informatics infrastructure provide the necessary strategies to transition to a continuously learning health system that aligns science and informatics, patient-clinician partnerships, incentives, and a culture of continuous improvement to produce the best care at lower cost.[4]

INTERRELATED CONCEPTS

Many interrelated concepts bear some relationship to health IT and health informatics but do not necessarily share the same set of attributes. Related concepts identified herein include data, information, knowledge, wisdom, trust, health, health care, meaningful use, bandwidth, and interoperability.

Interrelated concepts found in this book include **Clinical Judgment, Leadership, Communication, Collaboration, Safety, Evidence, Care Coordination, Health Care Quality, Ethics,**

Health Policy, and Health Care Law (Fig. 48.3). It is important to note that the Health and Illness concepts (in Section 2 of this book) are interrelated in that they provide the substance for the data, information, knowledge, and wisdom components that form the framework for meaningful use of health informatics.

CLINICAL EXEMPLARS

Box 48.2 displays common exemplars of health IT and informatics that may be encountered in clinical practice. This list is not complete and is ever-changing and expanding as new technologies and interfaces are developed and implemented in health care. Emerging new models of healthcare delivery will require informatics tools for improving quality and efficiency. Additional information for all exemplars presented can be found in multiple textbooks and websites related to health IT and informatics.

Featured Exemplars

Computerized Nursing Documentation

Computerized nursing documentation technology enables nurses to document all activities associated with the nursing process and serves as a repository for stored nursing data and information that can facilitate clinical decision making and interprofessional communication. Nurses can use an electronic documentation system to capture and store assessment data and transform these data into clinical information associated with diagnoses, nursing activities, and a plan of care to enable patients to reach desired outcomes. Electronic documentation systems facilitate effective, efficient, safe, and quality care for patients.

Bar Code Medication Administration

Bar code medication administration (BCMA) technology allows nurses to administer medications to patients effectively and safely. BCMA ensures that the right provider is giving the right patient the right medication in the right dose by right route at right time for the right reason and documents the result of that administration. The BCMA system reduces errors and adverse drug effects.

Clinical Decision Support Systems

Clinical decision support systems (CDSSs) provide electronic tools that can provide information and knowledge to assist the nurse in clinical decision making. CDSSs can include such tools as computerized alerts, reminders, clinical guideline protocols, condition-specific order sets, and diagnostic tools. CDSSs can significantly affect improvements in quality, safety, efficiency, and effectiveness of health care. Health ITs designed to improve clinical decision making are particularly attractive for their ability to provide a platform for integrating evidence-based knowledge into care delivery.[20]

Electronic Health Record Systems

EHR systems are real-time, patient-centered records that make information available instantly and securely to authorized users. An EHR is more than a digital version of a patient's paper chart because its system is designed to be inclusive of a broader view of a patient's care than might be provided by the standard clinical data collected in an individual provider's office. EHR systems can decrease the fragmentation of care by improving care coordination. EHRs have the potential to integrate and organize patient health information and facilitate its instant distribution among all authorized providers involved in a patient's care.[21]

FIG. 48.3 Technology and Informatics and Interrelated Concepts.

BOX 48.2 EXEMPLARS OF TECHNOLOGY AND INFORMATICS

Clinical Informatics

- Bar code medication administration
- Clinical decision support systems
- Computerized acuity systems
- Computerized nursing documentation
- Computerized provider order entry systems
- Disease/patient registries
- Electronic health record systems
- Electronic prescribing
- Health information exchange
- Telehealth tools
- Population health management tools

Consumer Health Informatics

- Personal health records
- Patient portals
- Patient-generated health data tools (i.e., PatientsLikeMe)
- Social media tools for online support
- Health and wellness apps
- Chronic disease management apps
- Home and self-care monitoring devices
- Smart devices and sensors
- Public health informatics

Biosurveillance Tools

- Geographic information system tools
- Predictive modeling tools
- Disaster preparedness tools
- Immunization registries

Bioinformatics Tools

- Homology and similarity tools
- Protein function analysis tools
- Structural analysis tools
- Sequence analysis tools
- Data mining and data analytics tools

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CASE STUDY

Case Presentation

The University Medical Center uses an EHR certified by the Office of the National Coordinator of Health Information Technology. To demonstrate the contribution of nursing to patient care, the chief nursing officer supports the Council for Nursing Informatics and provides trained informatics nurses to help the Council achieve the goals of safe patient care and quality nursing data. University Medical Center is a Magnet hospital actively engaged in a patient safety program, including the National Database for Nursing Quality Indicators (NDNQI) quality metrics.

Cassandra Mendoza, DNP, RN, is one of the informatics nurse specialists. Her current informatics project is to design and implement a falls risk management protocol in the EHR that will collect data to submit to NDNQI. She meets first with the nursing staff to determine the evidence supporting falls risk management. Based on this evidence, they select a falls risk assessment tool and determine what further data must be collected to document and manage the falls risk. They designate levels of risk as *none, moderate,* and *high* and define order sets for each risk level. Next, Cassandra interviews and observes the staff to gain understanding of the workflow surrounding the assessment, documentation, and management of a falls risk.

With this information, she begins to design the screens for the assessment and order sets to facilitate accurate data entry and present the information in such a way that all clinicians will be able to understand and use it to make accurate clinical judgments about the care of the patient at the point of care. As she evaluates the evidence, she determines data elements and their values (assessment questions, possible patient observation) and appropriate data types (e.g., numeric, free text, and coded response list). For each question and coded response list, she matches each concept to a standardized language. Next, she ensures that the design reveals the nursing process and maps each component to the Reference Information Model of Health Level Seven. She adds a decision support rule that states, "When the falls risk assessment score indicates a risk, Falls Risk is added to the patient problem list and an order set for the indicated risk level is presented to the nurse for approval." Finally, she determines the staff members who may view and interact with the protocol to ensure confidentiality.

After Cassandra completes the implementation of the protocol, she meets with the nursing staff again to evaluate whether the protocol meets their needs and represents the evidence for falls risk management. After their final approval for the protocol is obtained, she builds the screens in the EHR and implements a training program for the staff. Three months after implementation, Cassandra evaluates the protocol and its use by the staff. Results show that (1) the number of falls was reduced by 15%; (2) all the NDNQI falls metrics were collected electronically (thus saving money on data collection from charts); (3) nurses were very satisfied with the decision support, which saved them time by automatically adding the risk to the problem list and entering orders; and (4) patient satisfaction increased by 10%, based on free text comments about the staff's thoughtfulness in keeping patients safe.

Case Analysis Questions

1. Referring to Fig. 48.1, in what way does Cassandra incorporate the processes and tools into this project?
2. What would be barriers to implementing the new fall protocol in the EHR? Which strategies might help minimize these challenges?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 49

Health Disparities and Health Equity

Eun-Ok Im and Sangmi Kim

Health is essential for functioning in every sphere of life. Subsequently, the resources that are needed to keep healthy include not only healthcare but also health-promoting environments. These resources should be treated as necessities, not as commodities (e.g., luxury goods).[1] When these resources are not adequately provided to certain groups of people, health disparities occur and adversely affect these specific groups of people. These groups tend to have systemic obstacles to health as a result of their socioeconomic status (SES); racial/ethnic group; gender; sexual orientation or gender identity; age; religion; mental health; cognitive, sensory, or physical disability; geographic location; or other characteristics historically linked to discrimination or exclusion.[2]

Health disparities are prevalent throughout the world, between countries and within countries. For example, when comparing the countries Malawi and Japan, there is a 36-year gap in life expectancy (life expectancy is 47 years in Malawi compared with 83 years in Japan).[3] Within countries, health disparities occur because of social status, family income, race/ethnicity, gender, disability, or sexual orientation.[3] Significant health disparities in the morbidity and mortality of the U.S. population also exist. The Centers for Disease Control and Prevention reports health disparities and inequalities in various diseases; risk factors; environmental factors; social and behavioral determinants; and healthcare access by sex, race/ethnicity, income, education, disability status, and other social characteristics.[4] For example, premature death (before age 75 years) from stroke and coronary heart disease is higher in non-Hispanic African American populations compared with non-Hispanic White populations.[4] As another example, the incidence of diabetes is highest among men, those aged older than 65 years, non-Hispanic African American individuals, individuals of mixed race/ethnicity, and those with disabilities.[4]

Health disparities have long been a focus of nursing care; in fact, a number of nursing studies on health disparities in various populations have been conducted.[5,6] However, health disparities have rarely been explored as a major concept in nursing. When PubMed was searched with key words of "health disparity," "nursing," and "concept analysis," nine articles were retrieved, and one was a concept analysis of health disparities.[7] Even when the search was expanded with the key words of "health disparity," "nursing," and "concept," 26 articles were retrieved, and two articles pertained to the concept of health disparity.[7,8] Herein, the concept of health disparities is examined in the context of nursing.

In the Future of Nursing 2020–2030 report,[9] the National Academies of Sciences, Engineering, and Medicine provided a framework for nurses' roles in addressing the equity of health and health care. Specifically, five key areas were identified to strengthen nursing: workforce, leadership, education, well-being, and emergency preparedness and response. Also, the National Institute of Nursing Research (NINR) new strategic plan for 2022 to 2026 highlights "health disparity" as one of their major research lenses.[10] The NINR claims, "*nursing research, with its contextualized perspective, is ideally positioned to produce evidence needed to reduce and ultimately eliminate the systemic and structural inequities that place some population groups at a disadvantage in attaining their full health potential.*" With these two reports,[9,10] the importance of health disparity in nursing has drastically increased in recent years.

DEFINITION

Health disparities and health equity are intertwined. Various definitions of health disparities exist in the literature. The Institute of Medicine defined *health disparities* as "racial or ethnic differences in the quality of health care that are not due to access-related factors or clinical needs, preferences, and appropriateness of intervention."[11] According to Healthy People 2030,[2] a *health disparity* is defined as "*a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage.*" Common to these definitions is the notion of differences in health status between one or more groups compared with a more advantaged group. In contrast, *health equity* refers to "*the attainment of the highest level of health for all people.*"[2] In other words, health equity means social justice in health.[1] Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and healthcare

disparities.[2] Health disparities are the metric that can be used to measure progress toward achieving health equity.[1] A reduction in health disparities (in absolute and relative terms) is a piece of evidence that we are moving toward greater health equity.[1]

Since the mid-1990s when the term *health disparities* first came into use, it has generally been assumed to refer to health or healthcare differences between racial/ethnic groups, including differential access to screening and/or treatment options, or unequal availability of culturally or linguistically knowledgeable and sensitive health personnel.[12,13] However, equating health with health care draws attention primarily to diseases and healthcare services to alleviate the existing health inequality in the U.S. and could overlook the contribution of social determinants of health (e.g., race/ethnicity, SES, or gender) to health disparities. Because the delivery of health care is a major source of health disparities, the term *healthcare disparities* is often used. That is why the National Library of Medicine and the National Institutes of Health (NIH) recently provided two separate definitions related to health disparities: healthcare disparities and health status disparities. *Healthcare disparities* are defined as "*differences in access to or availability of facilities and services*."[8] *Health status disparities* are defined as "*the variation in rates of disease occurrence and disabilities between socioeconomic and/or geographically defined population groups*."[8]

Interestingly, the Health Resources and Services Administration (HRSA) recently replaced their definition of health disparities with that of health equity on their website. An opposite to the concept of health disparities, *health equity* was defined as "*the absence of disparities or avoidable differences among socioeconomic and demographic groups or geographical areas in health status and health outcomes such as disease, disability, or mortality*."[14] All these terms and their distinctions are necessary to understand health disparities in nursing practice and their effects.

SCOPE

From the broadest and most simplistic perspective, the scope of health disparities is represented by unavoidable and avoidable disparities (Fig. 49.1). This categorization can be easily applied to most cases. For example, disparity in health outcomes by age may be unavoidable because aging, as a biologic process, is not subject to intervention. Disparity in health outcomes as a result of unsafe living environments could be an avoidable cause of inequity. An avoidable disparity raises ethical questions of needless harm and injustice. Indeed, many health disparities are avoidable, and continuous efforts are necessary to identify and reduce existing health disparities that are preventable.

ATTRIBUTES AND CRITERIA

Carter-Pokras and Baquet asserted that health disparity should be viewed by "a difference in environment, access to, utilization of, and quality of care, health status, or a particular health outcome that deserves scrutiny."[15] These criteria could be used to identify health disparity. That is, if differences are observed in "environment, access to, utilization of, and quality of care, health status, or a particular health outcome,"[15] then we could say that a health disparity might exist.

Fig. 49.1 Scope of Concept: Health Disparities.

Before determining existence of a health disparity, however, it is critical to examine if the identified difference is inequality or inequity. As briefly stated previously, some health inequalities are unavoidable because their underlying causes are biologic or free choice, which may make changing the health determinants impossible or ethically or ideologically unacceptable. On the other hand, other health inequalities are not only unnecessary and avoidable, but also unjust and unfair. Their driving forces are external environmental factors/conditions that are outside the control of the individuals concerned.[16,17] Thus, Whitehead's seven determinants of health disparities are useful as attributes for health disparity[16]:

1. Natural, biologic variation
2. Health-damaging behavior that is freely chosen
3. The transient health advantage of one group over another when one group is first to adopt a health-promotion behavior
4. Health-damaging behavior in which the degree of choice of lifestyles is severely restricted
5. Exposure to unhealthy, stressful living and working conditions
6. Inadequate access to essential health services and other basic services
7. Natural selection, or health-related social mobility, involving the tendency for sick people to move down the social scale

The determinants of health disparity by Health Canada are also useful attributes to determine existing health disparity (although some overlap with Whitehead's determinants exists).[16,18] These include income and social status; social support networks; education; employment and working conditions; social environments; physical environments; personal health practices and coping skills; healthy child development; biology and genetic endowment; health services; gender; and culture.

THEORETICAL LINKS

There are several different theories associated with health disparities that are used in nursing, and each theory has strengths and limitations in explaining health disparities.[19] Three prominent theories used in nursing to explain health disparities are presented here.

The Social–Ecological Model

The social–ecological model aims to explain dynamic interrelations among various personal and environmental factors. This model basically evolved from the ecological systems theory of child development by Bronfenbrenner, who proposed

five socially organized subsystems related to human development: microsystem, mesosystem, exosystem, macrosystem, and chronosystem.[20,21] Each of these five systems interacts within the context of the person's life and provides diverse options and sources of growth. The interactions within and between systems are bidirectional and have impact from and toward the person. The mesosystem is beyond the dyad or two-party relation and links over two systems that a person lives.[20,21] Also, mesosystems link the structures of the person's microsystem. The macrosystem consists of cultural values, customs, and laws, and includes the overall patterns of ideology and organization that distinguish an individual society or social group. The chronosystem includes time as a dimension as it relates to environmental contexts.[20,21] The chronosystem could be either external or internal. For instance, the timing of a family member's death could be an external chronosystem, and physiological changes as a result of aging could be an internal chronosystem.

The social–ecological model has been widely used in nursing research and practice related to health disparities because it provides an understanding of interrelationships of individuals and systems, and it can provide a perspective to identify health disparities at each system level and directions for interventions at each system level. For example, the social–ecological model allows nurses to identify cultural barriers in access to health care at the level of macrosystem and to develop an intervention to tackle the cultural barriers to reduce subsequent health disparities.

The Structural–Constructivist Model

The structural–constructivist model is based on the assumption of dual nature of human existence.[19] The model adopts a constructivist perspective that the reality of life is based on a mental representation constructed by combinations of socially shared understandings within a society. Simultaneously, the model adopts a structural perspective that people are constrained by the external structures in which they are embedded (e.g., social relations created by the shared and distributed expectations of others). In this model, the concept of race/ethnicity is socially or culturally constructed with the underlying logic that when we can control the ways in which race/ethnic groups differ, racial/ethnic disparities will disappear. This perspective/model strongly supports the social and cultural construction of race/ethnicity that frequently results in health disparities observed in healthcare systems,[22,23] and it gives directions for nursing research and practice in understanding health disparities in both clinical and community settings.

The Cultural Competence Model

The cultural competence movement grew out of early efforts to bridge the divide between the largely biomedical, White, middle-class American culture perspectives of clinicians and the perspectives of patients (mainly immigrants) whose experience and language put them at a substantial cultural distance from American health care.[24] Cultural competence expanded in the late 1980s through the 1990s in three ways. First, the populations of interest expanded from primarily immigrants to essentially all racial/ethnic minority groups. Second, the conceptual boundary expanded beyond culture per se to such issues as prejudice, stereotyping, and the social determinants of health. Third, the scope expanded beyond the interpersonal domain (between patients and healthcare providers) to health systems and communities. Cultural competence in health care entails (1) understanding the importance of sociocultural influences on patients' health beliefs and behaviors, (2) considering how these factors interact at multiple levels of the healthcare delivery systems (organizational, structural, and clinical), and (3) devising interventions that take these issues into account to ensure the delivery of high-quality health care to diverse patient populations.[25]

Despite the existence of several different models of cultural competence, several key elements are shared at interpersonal and organizational levels (Box 49.1).[24] Interpersonal interactions focus on the ability of a provider to bridge cultural differences to build an effective relationship with a patient. Healthcare organizations focus on meeting the needs of diverse groups of patients. Nevertheless, the cultural competence model has been criticized for its exclusive emphasis on healthcare providers to improve health disparities.[26]

CORE COMPETENCIES

Health Disparities

- Define a population at increased risk of systematic obstacles to health (related to their social determinants of health).
- Assess population health data to identify and evaluate health disparities.
- Assess the priorities of the vulnerable community or clinical population.
- Apply an understanding of the public health system (e.g., laws, policies) and its interfaces with clinical healthcare in addressing vulnerable populations' health needs.
- Participate in the development and implementation of sociocultural and linguistically responsive interventions.
- Identify ethical principles to protect the health and safety of diverse, vulnerable populations.
- Engage with other health professionals to address health inequities.
- Challenge biases and barriers that affect health outcomes of vulnerable populations.

CONTEXT TO NURSING AND HEALTH CARE

Health disparities witnessed in the context of nursing and health care mainly represent healthcare disparities. These occur in various nursing settings and/or situations and are roughly categorized into four cases: unavoidable and acceptable, unavoidable and unacceptable (unjust), avoidable and acceptable, and avoidable and unacceptable.

Unavoidable and Acceptable

The health disparities that are unavoidable and acceptable should not be a concern for nurses. For example, in an emergency room, nurses could observe health disparities in emergency visits by age; in general, older people make more emergency visits compared with younger people. In this situation, age becomes a determinant of the disparity, and aging is unavoidable and acceptable.

BOX 49.1 Key Elements of Cultural Competence for Interpersonal Interactions and Organizations

Interpersonal Interactions

- Exploring and respecting patient beliefs, values, meaning of illness, preferences, and needs
- Building rapport and trust
- Finding common ground
- Awareness of one's own biases/assumptions
- Knowledgeable about different cultures
- Awareness of health disparities and discrimination affecting minority groups
- Use of interpreter services when needed

Organizations

- Diverse workforce reflecting the diversity of patient populations
- Healthcare facilities convenient and attentive to communities
- Language assistance available for patients with limited English proficiency
- Ongoing staff training regarding the delivery of culturally and linguistically appropriate services

From Saha, S., Beach, M. C., & Cooper, L. A. (2008). Patient centeredness, cultural competence and healthcare quality. *Journal of National Medical Association, 100*(11), 1275–1285.

Unavoidable and Unacceptable

Health disparities that are unavoidable and unacceptable can also happen in healthcare settings and should be a concern for nurses. For example, the high prevalence of diabetes among Hispanic populations might be partially due to genetic factors, so such a disparity in the prevalence of diabetes could be unavoidable. However, a persistently higher risk of diabetes in these populations due to inappropriate diabetes prevention and management (e.g., lack of accessibility and affordability of health care and wholesome foods in the neighborhoods) is unacceptable, which raises a red flag for nurses.

Avoidable and Acceptable

Most health disparities that are avoidable are not viewed as acceptable. Only in unique or unusual circumstances can avoidable health disparities be considered acceptable. For example, a health disparity could exist among people involved and those not involved in a natural disaster. When a natural disaster occurs, unequal health outcomes among residents in the affected area may be acceptable even though the disaster and resultant health disparity could be avoidable if a proper contingency plan were in place at the local, state, or national level.

Avoidable and Unacceptable

Health disparities that are avoidable and unacceptable unfortunately occur in healthcare settings, and these are the targets of interventions. For example, a disparity in cancer pain management exists between Asian and White populations. This difference is attributable to Asian cultural values and attitudes related to cancer pain and pain medication distinguished from the cultural values of White populations. The disparity is avoidable if Asian patients with cancer are adequately educated and instructed on cancer pain management strategies, including pain medication and complementary and alternative medicine. Also, this disparity is unacceptable because this gives an unnecessary burden of pain to Asian patients with cancer that could be easily managed by using existing strategies. Several avoidable and unacceptable disparities are worth further exploration from the perspective of healthcare disparities because they are frequently seen and experienced by nurses.

Lack of Health Insurance and High Healthcare Costs

Health insurance is the most significant contributing factor to poor quality of care. Uninsured people are less likely to get adequate care for disease prevention (e.g., cancer screening, dental care, counseling about diet and exercise, and flu vaccination) and/or for disease management (e.g., diabetes care management), and they are more likely to visit the emergency department and be admitted to the hospital for ambulatory care-sensitive conditions.[27,28] Many racial/ethnic minorities, people of low socioeconomic status, and other minority groups lack adequate health insurance compared with their counterparts. For example, Hispanic and non-Hispanic African American populations have substantially higher uninsured rates compared with Asian/Pacific Islander populations and non-Hispanic White populations.[4] Also, minorities are disproportionately enrolled in lower-cost health plans that place greater per-patient limits on healthcare expenditures and available services.[11]

Even with health insurance, the financial burden of health care is high and continuously increasing. High premiums and out-of-pocket payments can be a significant barrier to accessing needed medical treatment and preventive care.[27] From 2006 to 2011, the percentage of people younger than age 65 years whose family's health insurance premium and out-of-pocket expenses were more than 10% of total family income was more than 3.5 times higher among poor individuals and low-income individuals and more than twice higher among middle-income individuals compared with that of high-income individuals.[27]

Lack of Transportation to Healthcare Providers

The lack of access to affordable transportation could physically isolate people of color, households in rural areas, and people with disabilities from healthcare facilities. It also forces families to spend a large percentage of their budget on cars and other expensive options rather than actual healthcare costs. An increasing number of people are unable to reach healthcare providers and healthcare services because they reside in non-walkable areas with limited public transportation. Individuals of low socioeconomic status, households in rural areas, and people with disabilities could face significant hurdles because many cannot drive and/or because public transportation is often unavailable, inaccessible, or unreliable.[29]

The poorest one-fifth of U.S. families spend approximately 42% of their income on transportation. This massive expenditure on transportation can wipe out their already limited budget for out-of-pocket medical expenses, nutritious foods, and healthy recreational activities. Because affordable housing is increasingly located far from main transportation lines and jobs, low-income people and people of color are more likely to have

long commutes, which reduces their time for exercise, shopping for healthy foods, and additional earning opportunities.[29]

Ineffective Provider–Patient Communication

Sociocultural differences between healthcare providers and patients often influence patient and provider communication. People from different backgrounds frequently have differences in their recognition of symptoms, thresholds for seeking care, comprehension of management strategies, expectations of care (e.g., preferences for or against diagnostic and therapeutic procedures), and adherence to preventive measures and medications.[30] Furthermore, patients with different sociocultural backgrounds from those of healthcare providers may not feel comfortable asking questions or disclosing personal health information. Because of the pressures of a fast-paced clinical setting, healthcare providers frequently experience difficulty determining what the patient does not understand and addressing this knowledge gap adequately. The printed health information materials that are frequently used in an effort to bridge the knowledge gap may be too complex or scientific for patients to understand.[31,32] Thus, when sociocultural differences between healthcare providers and patients are not appreciated or communicated effectively in clinical encounters, patient dissatisfaction, poor adherence, poorer health outcomes, and racial/ethnic disparities in health care easily happen.[30]

Language Barriers

Patients who face language and cultural barriers are less likely than others to have a usual source of medical care. They receive preventive services at reduced rates and have an increased risk of nonadherence to medication. Among patients with psychiatric conditions, those who encounter language barriers are more likely than others to receive a diagnosis of severe psychopathology.[33] Ad hoc interpreters, including family members, friends, untrained members of the support staff, and strangers found in waiting rooms or on the street, are commonly used in clinical encounters. However, the use of such unqualified interpreters results in increased medical errors, less effective patient–clinical provider communication, poorer follow-up and adherence to clinical instructions, and possible conflicts with patient privacy rights.[33,34]

Biased Clinical Decision Making

Clinical decisions are shaped by the attributes of patients (e.g., age, sex, socioeconomic status, race/ethnicity, language proficiency, religion, nationality, and insurance status), healthcare providers (e.g., specialty, level of training, clinical experience, age, sex, and race/ethnicity), and practice settings (e.g., location, organization of practice, form of compensation, performance expectations, and incentives).[30,35] Thus, health disparities, especially healthcare disparities, often result from healthcare providers' bias or prejudice against minorities, greater clinical uncertainty when interacting with minority patients, and beliefs or stereotypes about the health or health behaviors of minority patients. If a healthcare provider has difficulty accurately understanding his or her patient's symptom(s) or is less sure of his or her patient's signal, then the provider is likely to place greater weight on his or her prior beliefs, which may differ by the provider's age, gender, socioeconomic status, and race/ethnicity, than on information gathered in a clinical encounter. This reliance on prior beliefs may result in discordance between health services and patient needs.[11]

Stereotyping often leads to biased clinical decision making. Stereotyping refers to the process by which people use social categories (e.g., gender or race/ethnicity) in acquiring, processing, and recalling information about others. Both implicit and explicit negative attitudes and stereotypes of healthcare providers significantly shape interactions with patients, influence how information is recalled, and guide expectations and inferences in systematic ways.[11] Stereotyping often occurs subconsciously, unlike prejudice or discrimination. If it is left unchecked, stereotyping has a detrimental clinical effect on certain groups deemed as less worthy of diagnostic or therapeutic procedures or resources.[30]

Biased clinical decision making also derives from the bias in health care, operationalized as discrimination on the basis of patient attributes. Patients with certain sociodemographic features have a propensity to be assessed, diagnosed, referred, and treated not only differently but also at a lower level of quality or to a lesser degree of adherence to established standards of care than different groups of people with comparable health problems.[35]

Prejudice, which refers to unjustified negative attitudes based on a person's group membership, is another source of biased clinical decision making. An example of prejudice related to race/ethnicity is the belief that African American patients are less intelligent, less educated, more likely to misuse drugs and alcohol, more likely to fail to comply with medical advice, and more likely to lack social support than white patients, regardless of an individual patient's actual income, education, and personality.[11]

Patient's Mistrust and Refusal

In response to historical factors of discrimination, segregation, and medical experimentation or to real/perceived mistreatment by healthcare providers, African American patients may convey mistrust, refuse treatment, or comply poorly with treatment. As a result, healthcare providers may become less engaged in the treatment process such that patients are less likely to be provided with more vigorous treatments and services.[11]

INTERRELATED CONCEPTS

Many concepts discussed in this book are interrelated to the concept of health disparities and health equity. Some of the most closely interrelated concepts are presented in Fig. 49.2 and described further here. Health disparities are closely linked to **Culture**. Nursing scholars have suggested that marginalization because of cultural differences could decrease the opportunities to receive equitable health care, which subsequently leads to health disparities.[25,36] Nursing scholars also claim that marginalization because of cultural differences and subsequent disadvantages including financial, environmental, and linguistic barriers result in health disparities.[36–38] Furthermore, cultural

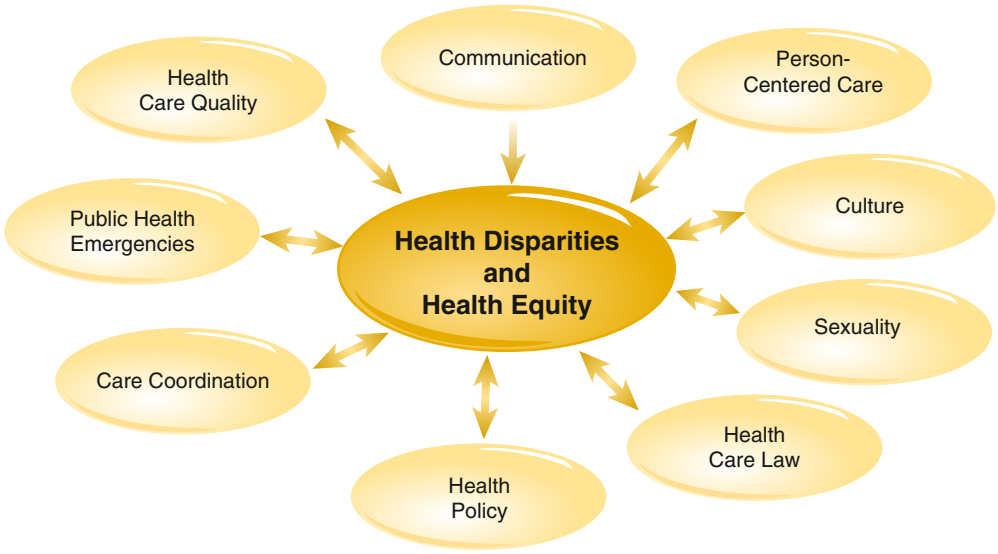

Fig. 49.2 Health Disparities and Interrelated Concepts.

differences frequently give rise to issues with **Communication** between healthcare providers and patients, and the miscommunication could cause health disparities.[39] Stereotypes, bias, or prejudice of healthcare providers can be activated or increased by miscommunication with patients, which can then lead to diminished **Health Care Quality** provided to the patients.[37] Additionally, it is well acknowledged that **Sexuality** is a social determinant of health where sexual and gender minorities (i.e., lesbian, gay, bisexual, transgender, queer, and other [LGBTQ+]) face health disparities, including increased rates of mental disorders, deaths by suicide, decreased access to and use of preventive healthcare services (e.g., cancer screenings) because of interpersonal and systemic discrimination, violence, prejudice, and oppression.[40] **Person-Centered Care** has been promoted as one way to address health disparities, exemplified by Patient-Centered Medical Homes (PCMH).[41,42] PCMH offers team-based, patient-centered care where patients play an active role in their healthcare, and their primary care provider is responsible for **Care Coordination** across all elements of the healthcare system and the patients' community to meet their preventive, acute, and chronic healthcare needs.[43] Through the COVID-19 pandemic, awareness has grown about the importance of **Public Health Emergencies**. Considering that the COVID-19 pandemic hit the underprivileged populations harder, equipping healthcare providers with public health emergencies and disaster management is critical to prevent exacerbating the extant or new health disparities. **Health Policy** and **Health Care Law** powerfully influence healthcare utilization, particularly for vulnerable populations including minorities, people with low SES, and people with disabilities. For example, extending Medicaid coverage from 6 weeks to 1 year postpartum may reduce inequities in care. Currently, the federal mandate for pregnancy-related Medicaid provides a coverage of up to 60 days postpartum care for women living at 138% of the federal poverty line (up to 60 days postpartum). However, the 2021 American Rescue Plan included a new option that allowed states to extend the postpartum Medicaid coverage from 60 days to 1 year postpartum through a state plan amendment.[44] The extended postpartum Medicaid coverage can help decrease the uninsured rate among women who gave birth in the past year, increase the preconception Medicaid enrollment among low-income women, and reduce racial disparities in preterm birth and low birth weight.[45,46]

CLINICAL EXEMPLARS

Despite numerous types of health disparities, only the avoidable and unacceptable health disparities are presented in Box 49.2 because these are the ones that healthcare providers, including nurses, frequently encounter in clinical and community settings. Furthermore, these are the health disparities that healthcare providers need to target to intervene. A detailed discussion of each exemplar of health disparities is beyond the scope of this textbook; however, some of the most important exemplars across the age span are briefly described here.

Featured Exemplars

Unequal Receipt of Early and Adequate Prenatal Care

Early and adequate prenatal care is defined as the prenatal care initiated by the 28th week of pregnancy and in which a woman has at least 80% of the expected number of prenatal visits.[27] Early and adequate prenatal care helps to promote healthy pregnancies through screening and management of risk factors and conditions and through education and counseling on healthy behaviors during and after pregnancy. Common barriers to getting prenatal care as early as desired (or at all) are limited resources, transportation issues, and not knowing that one is pregnant.[47]

Unequal Receipt of Recommended Immunizations

Immunization protects recipients from illness and protects others in the community who are not vaccinated. Beginning in 2007, the recommended vaccines that should be completed by the age of 19 to 35 months include diphtheria–tetanus–pertussis vaccine (DTaP), polio vaccine, measles–mumps–rubella (MMR) vaccine, *Haemophilus influenza* type B (Hib) vaccine,

BOX 49.2 EXEMPLARS OF HEALTH DISPARITIES

- Adverse birth outcomes (e.g., preterm birth, low birth weight)
- Cancer mortality
- Cancer screening
- COVID-19–related infection, hospitalization, and death
- Chronic diseases
- Early and adequate prenatal care
- Healthcare access
- Health insurance coverage
- Heat-related and cold-related morbidity and mortality
- Immunizations
- Infant, fetal, and perinatal mortality
- Intimate partner violence
- Maternal mortality
- Medication adherence
- Mental health services
- Obesity
- Opioid overdose
- Pain management
- Physical activity
- Quality of palliative care
- Safe neighborhood
- Substance use
- Telehealth usage

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hepatitis B vaccine, varicella vaccine, and pneumococcal conjugate vaccine (PCV).[27] However, according to the Centers for Disease Control and Prevention (CDC), children living below the federal poverty level had a lower coverage of nearly all vaccines compared with those at or above the poverty level in 2014. For instance, the coverage of vaccines (with ≥4 doses of DTaP, ≥3 doses of polio vaccine, ≥1 dose of MMR, the primary and full series of Hib, ≥4 doses of PCV, ≥2 doses of Hepatitis A, the rotavirus series, and the combined seven-vaccine series) was lower among children below the poverty level.[48]

Unequal Pain Management

Judgments about pain are frequently influenced by the characteristics of patients (e.g., race/ethnicity), situations (e.g., medical evidence), and healthcare providers (e.g., experience).[49] In the face of such uncertainties, latent/implicit stereotypes may be activated, advantaging patients who fit positive stereotypes (e.g., White individuals) and disadvantaging patients who do not (e.g., African American individuals).[49] For example, African American individuals and Hispanic individuals are seen as more likely to require scrutiny for potential drug misuse. Consequently, primary care providers are more likely to underestimate pain intensity in African American and Hispanic individuals, and use less and passive pain management than they are likely to with other sociodemographic groups.[49,50]

Unequal Breast Cancer Screening

Women without health insurance are much less likely to get a mammogram than women with health insurance. In the United States, breast cancer is the most common cancer in Asian American women, but these women have relatively lower rates of breast cancer screening than African American and White women.[51,52] Furthermore, disparities in breast cancer screening reportedly result from low income, lack of a local mammography center, lack of transportation to a mammography center, lack of a usual healthcare provider, lack of a recommendation from a healthcare provider to get mammography screening, lack of awareness of breast cancer risks and screening methods, and cultural and language differences.[52]

Unequal Quality of Palliative Care

Racial/ethnic minorities tend to receive lower-quality palliative care across multiple domains, including satisfaction, communication, and pain management. Compared with White patients, African American patients report less satisfaction with the quality of communication, including the extent to which healthcare providers listen and share information, with greater disparities being reported for racially discordant patient–provider relationships. Moreover, racial/ethnic minorities are disadvantaged in terms of the access to hospice care. Minority patients have lower rates of hospice use than White patients across diagnoses, geographic areas, and settings of care.[53] For instance, African American women with breast cancer were less likely to enter hospice; however, they were more likely to undergo an intensive care unit admission, more than one emergency visit or hospitalization in the last 30 days of life, and die in the hospital.[54] Racial/ethnic differences in knowledge, cultural beliefs, and treatment preferences are regarded as barriers to the use of palliative care.[53]

Unequal COVID-19–Related Infection, Hospitalization, and Death

Compared with non-Hispanic White individuals, racial/ethnic minority individuals showed higher severity of COVID-19 disease upon admission to the hospital.[55] Non-Hispanic American Indian or Alaska Native, Hispanic or Latino, non-Hispanic Black, and non-Hispanic Asian or Pacific Islander individuals were more likely to have COVID-19–associated hospitalizations, intensive care unit admissions, or in-hospital deaths compared with non-Hispanic White individuals during the first year of the pandemic.[56,57] These outcomes are attributable to limited healthcare access, higher rates of underlying conditions (e.g., diabetes, high blood pressure), lower levels of education, income, and wealth among racial/ethnic minority populations, and vaccine hesitance partially due to cultural attitudes and values.[55] Furthermore, the Black-Lives-Matter movement, anti-Asian racism, xenophobia, and public health cautions and actions that co-occur during the COVID pandemic have added another layer of stress to racial/ethnic minority individuals.[58–61]

CASE STUDY

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Case Presentation

Jones Antoinette, a 21-year-old pregnant African American woman, visited an obstetric clinic for prenatal care for the first time at the 30th week of gestation. Her baseline vital signs were normal. She was assigned to a White nurse midwife for her prenatal care throughout the remaining pregnancy until her delivery.

The nurse midwife interviewed and assessed Jones' sociodemographic characteristics, past medical history, health behaviors, and psychological health status. Jones had a medical history of abnormal glucose tolerance and asthma, but she has not seen a healthcare provider to treat the asthma because she lacks health insurance. Prior to her pregnancy, she smoked five cigarettes a day, but she stopped smoking when she learned she was pregnant. She also said that she drank often during the weekends but has cut back. She complained of depressive feelings and sleep disturbances as a result of several life crises. She is at risk of losing her part-time job and has not had a steady stream of income for months. She has a car, but she often gets rides because she cannot afford gas. She wants to move from her current apartment because there is high crime activity in her apartment complex—even drug use in the hallways. Her asthma has become worse as a result of poor housing conditions. Furthermore, her boyfriend was recently arrested and has been asking her for money for legal help. Under these circumstances, she was not sure if it was right to carry this baby. However, she has a strong religious belief and received emotional and material support from her church community, which has helped meet her essential needs and continue the pregnancy.

After the interview, the nurse midwife ordered a regular diabetes check, which should have been conducted at the 28th week of gestation. The patient's history of abnormal glucose tolerance has a potential to put Jones and her fetus at high risk. The nurse midwife informed Jones of cystic fibrosis screening as well. This genetic test is not mandatory, but it is encouraged. Jones listened to the nurse midwife carefully and asked if it would be good for her baby. After getting information on the test, Jones wanted to be tested. The nurse midwife provided the test consent form and printed information on the screening test. Jones signed the consent form without reading the printed information. Before leaving, the nurse midwife asked if Jones had any questions or concerns, and Jones said "no." After meeting with the nurse midwife, Jones met a nurse coordinator who was responsible for scheduling of the next appointment and additional tests, case management, and patient education. When the nurse coordinator double-checked whether Jones really wanted cystic fibrosis screening, Jones said that she did not hear about the test from the nurse midwife.

Case Analysis Questions

1. What risk factors exist that can threaten the health of Jones and her fetus during the pregnancy?
2. What protective factors exist that can buffer against Jones' high risk of maternal and fetal health?
3. How can the change in Jones' response regarding the prenatal testing for cystic fibrosis be explained?
4. What interventions would be helpful for Jones to have healthy pregnancy and delivery?

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CONCEPT 50

Care Coordination

Kimberly D. Davis and Pamela Parsons

Care coordination is recognized as a professional standard and essential competency of the registered nurse.[1–3] Current healthcare reform has driven the need to improve quality of care delivery while reducing inappropriate use of healthcare services. Care coordination is recognized as essential for organizing care and information around patients' needs and preferences.[2] Additionally, care coordination is one of the six priorities identified by the National Quality Strategy (NQS) as needed to provide more affordable care, improved health for people and communities, and better patient-centered care.[4] The Patient Protection and Affordable Care Act (ACA) identifies care coordination as fundamental in helping the healthcare industry shift away from a fee-for-service mindset and toward value-based care delivery models.[5] Without the adoption of care coordination models, fragmented service delivery, cost inefficiencies, and poor health outcomes will continue. This concept presentation explores the defining characteristics, attributes, and theory supporting care coordination, highlighting clinical exemplars and other related concepts.

DEFINITION

There are many names and descriptions for care coordination, and its definition continues to evolve, particularly as stakeholders become interested in healthcare improvement strategies. Examination of professional organizations that have endorsed definitions to guide practice and measurement of care coordination show evidence of its complexity and the need to adopt a multidimensional approach to coordinating care. Following a systematic review, which identified over 40 definitions of care coordination, the Agency for Healthcare Research and Quality (AHRQ) *Care Coordination Measures Atlas* cites the definition for care coordination broadly as "*…the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of healthcare services. Organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities and is often managed by the exchange of information among participants responsible for different aspects of care.*"[6] The authors emphasize that, in order to meet patient needs and deliver high-quality, high-value health care, consideration must be given to the patient's and family's perspectives, the healthcare professional's perspective, and the system representative's perspective.

For the purposes of clarifying direct measurement of care coordination, the National Quality Forum (NQF) issued a report that addressed performance measurement gaps in care coordination. The definition of care coordination endorsed in this report is "*the deliberate synchronization of activities and information to improve health outcomes by ensuring that care recipients' and families' needs and preferences for healthcare and community services are met over time.*"[7] Recommendations include a need to focus efforts to better provide comprehensive assessment, monitoring of care plans, linkages to services, measurement of progression toward goals, and a shared accountability that requires skillful interprofessional communication. In addition, in an effort to address the diversity of patient needs, care coordination must appropriately link communities and healthcare systems while staying true to the patient's goals.[7]

Nursing, with its holistic and comprehensive approach to person-centered care, is positioned to assume an integral role in the development and implementation of care coordination models. In 2018, the American Nurses Association published *Care Coordination: A Blueprint for Action*, in which the authors synthesized AHRQ and NQF definitions, analyzed the current landscape, and produced six actionable steps for nurses to consider in the advancement of care coordination initiatives. The report considers the importance of "patient, family, and caregiver engagement"; "competency and readiness" of the registered nurse; "teams and teamwork"; "documentation and health information technology (HIT)"; "quality and performance measurement"; and "payment." Furthermore, this blueprint acknowledges the importance of expanding and supporting the role of the registered nurse in care coordination strategies.[8]

SCOPE

The scope of care coordination is dependent on the needs and complexity of the individual (Fig. 50.1). An individual with minimal healthcare needs may be mostly self-sufficient and

Fig. 50.1 Scope of Concept: Care Coordination.

require consultation with perhaps one member of the interprofessional team. Alternatively, individuals with complex healthcare needs and multimorbidity often require multiple members of the healthcare team to best coordinate an extensive list of services and resources. The goal for any healthcare system is to coordinate care well, especially during transitions between health settings. Although the need for efficient coordination of care exists for all patients, it is especially important for the management of individuals with complex chronic conditions with consideration of barriers associated not just with physical conditions, but with mental illness and the effect of social determinants of health.

ATTRIBUTES AND CRITERIA

An attribute is a characteristic associated with a concept that clarifies the concept. Several common attributes are in nearly all care coordination models (Box 50.1).

Optimal care coordination features patient-centered, evidence-based care highlighted by efficiency that results in the achievement of the NQS goals for improved quality of health care; better health of individuals, communities, and populations; and delivery of health care that is affordable.[5] Efficiency is conceptualized broadly to include effective communication among the healthcare team, consumption of medical treatment and associated costs, and a consideration of time as a resource. Additionally, in an effort to improve health outcomes, care coordination efforts will demonstrate movement toward value-based care delivery and away from fee-for-service as a response to the goals of the ACA.[5]

THEORETICAL LINKS

Transitions between health settings and transitions in health status are recognized areas of high need for care coordination in order to ensure the individual's clinical stability and to address potential gaps in services. The AHRQ's *Care Coordination Measures Atlas* supports the idea that care coordination must be considered in the context of care transitions and identifies that transitional care may occur across or within settings, among those involved in the patient's care, and may be longitudinal with transitions occurring between episodes of care.[6] It is, therefore, useful to consider a theoretical framework for care coordination, such as that of Radwin and colleagues, that provides analysis in the context of transitional care.[9] The two fundamental domains described within this theoretical framework include continuity of care and activities of the clinician, both of which must simultaneously occur across care transitions. Continuity of patient care requires connected health care and should provide consistency for the patient and healthcare team. For example, treatment plans should be communicated between settings and among the healthcare team so that it is clear that patient information has been adequately shared. Relationships should be maintained between patient and clinician to promote consistency. Activities of the clinician must include skilled interprofessional communication, covering provision of care during transitions, clearly delineating who on the team is accountable for aspects of the patient care, and connecting the patient to resources.[9] Most importantly, using a reliable theoretical framework provides a means to link activities related to patient care delivery to measurable outcomes, strengthening the evidence related to care coordination and quality care.

Within the context of these two central domains, efforts to achieve patient-centered care and assess patient outcomes must be considered both before and after transitional care. Additionally, consideration of patient and healthcare system characteristics must be applied in order to inform patient-centered care and patient outcomes. Organizational support is integral to successful implementation of care coordination activities. Optimally, when care is organized within this theoretical framework, communication among the interprofessional team is enhanced resulting in improved quality of the patient care experience as individual needs are met.[9]

BOX 50.1 Key Attributes of Care Coordination

- Patient-centered/individualized plan of care
- Evidence-based care
- Efficiency
- Improved health outcomes
- Value-based care delivery
- Interprofessional team-based care

CONTEXT TO NURSING AND HEALTH CARE

Target of Care Coordination Efforts

Care coordination is important for everyone. During the life course, every person will have at least a temporary need for improved coordination and communication between providers, settings, or for periods of time during an illness. At a minimum, we are all at risk for an episodic illness with at least short-term needs for care coordination. However, the current structure of health care in the United States—and the workforce supporting it—does not allow for everyone to be supported by a fully integrated care coordination program or model of service delivery.

Individuals particularly vulnerable to fragmented, uncoordinated care on a chronic basis are often at highest risk of negative health outcomes. Care coordination services and case management are cost-intensive, necessitating risk stratification strategies to target services for those with demonstrated high need.[10] Currently, as evidence mounts and the translation, adoption, adaptation, and implementation of care coordination models are accepted throughout the country, the priority population will need to be those most vulnerable and frail. This may include a targeted focus on serving children with special healthcare needs, the older adult population with frailty, those in crisis situations or catastrophic events, and people at the end of their lives before other high-risk

CORE COMPETENCIES

Care Coordination

- Collaborate with all members of the interprofessional healthcare team, including patients and families, by using effective communication strategies.
- Engage patients, families, caregivers, and the healthcare team in the plan of care by advocating for shared accountability and mutual goal setting.
- Integrate evidence-based transitional care models to improve care within and across settings.
- Navigate complex healthcare systems to ensure patients and families are appropriately connected to care and resources.
- Use risk stratification to identify patients who will receive the most benefit from care coordination services.
- Demonstrate proficiency with health information technology by documenting care coordination activities, promoting interoperability, and leading data management initiatives.
- Evaluate the effectiveness of care coordination strategies through selection and implementation of quality outcome measures.

populations. People who will likely develop the need for care coordination are individuals with complex conditions or life situations that increase the likelihood of negative outcomes. This includes people with cognitive impairments, complex medical or mental health conditions, disabilities, low incomes, or unstable health insurance coverage. Unfortunately, it is only a matter of time before the latter high-risk group will also develop the need for care coordination services and management.

The Future of Nursing 2020–2030: Charting a Path to Health Equity emphasizes the need for enhanced strategies and expanding roles for nursing with competencies related to care coordination. Registered nurses across settings, from primary care, to hospital, to palliative care and community-based settings are in key positions to serve in the role of nurse navigator.[11] The paradigm shift in healthcare financing and delivery of holistic patient-centered, family-focused care is slowly evolving; there is a noticeable shift occurring as healthcare teams consider how to implement value-based care and how to best improve healthcare quality outcomes. Evidence supports that 80% of poor health outcomes are related to issues outside of clinical care delivery, and include health behaviors (i.e., tobacco and alcohol use, diet, and exercise), social and economic factors (i.e., education, employment, and income), and the physical environment (i.e., housing, quality of air and water).[12] To be successful, it is imperative that factors related to social needs and determinants of health are included in assessment with appropriate connection to resources as needs are identified. Registered nurses in primary care are in key roles to complete these assessments, connect individuals to services and resources, and manage care during transitions between healthcare settings.[13,14] It will take time and continued research to fully implement care coordination for everyone, at all levels of need and in all healthcare settings. Holistic care coordination is targeted toward those most likely to benefit, which includes those who are most vulnerable: low-income, facing health disparities related to social determinants of health, those with chronic illness and multimorbidity, children, and frail older adults.

Care Coordination Models

Effective care coordination models will demonstrate quality healthcare delivery by documenting improved patient outcomes and promoting cost effectiveness. However, care coordination models are complex due to constraints of healthcare financing, inherent difficulty working in interprofessional teams, and lack of interoperability of health information systems. Review of the literature reveals many effective models of care coordination that have achieved documented improved patient outcomes and cost effectiveness; however, many challenges still exist with implementation of these models, and the role of the registered nurse in care coordination models is still evolving. The American Academy of Nursing cites multiple examples of nurse-led care coordination models that have had significantly positive effect on patient outcomes.[15]

To understand and evaluate the different care coordination models, it is important to recognize that people live and have needs beyond the healthcare system. Healthcare services are just one component in our society of services supporting health. Care coordination for some people may require the knowledge and organization of social services such as those in sectors of education, employment, and the community from housing to utilities, transportation, or insurance of all types. For others, care coordination requires knowledge and organization of medical needs such as prescriptions, medical equipment, and chronic disease self-management. When coordinating care for a person's needs that may fall within these different arenas, care coordination models for consideration should ideally include integrated models that include social, behavioral, and medical services (Fig. 50.2). Integrated models are still evolving, but models such as the Johns Hopkins Community Health Partnership have shown very promising results including improved patient outcomes, decreased healthcare utilization (i.e., emergency department visits), and significant cost savings.[16] Fig. 50.3 illustrates the balance in an ideally functioning integrated model that is proactive, focuses on patient wellness using evidence-based methods, employs effective communication, brings patients and healthcare teams together, and appoints appropriate use of resources.[17,18]

Community-Based Models

Leadership and organizing responsibility for community-based models of care coordination can be at the local or state level. For example, area agencies on aging are often designated as coordinators and administrators of care coordination programs that can then be standardized at some level across a state. County social service agencies also assume care coordination responsibilities and are often able to serve as a single entity for multiple funding sources, such as waiver services, block grants, state-funded services, and Medicaid. Having a single entity coordinate all relevant social services can reduce the likelihood of redundancy and duplication of efforts. Advances in technology and electronic social networking interfaces will continue to facilitate opportunities for partnership and referral to social services.

Community-based models of care coordination are an important part of promoting health and independence in the community. As one example, the Richmond Health and

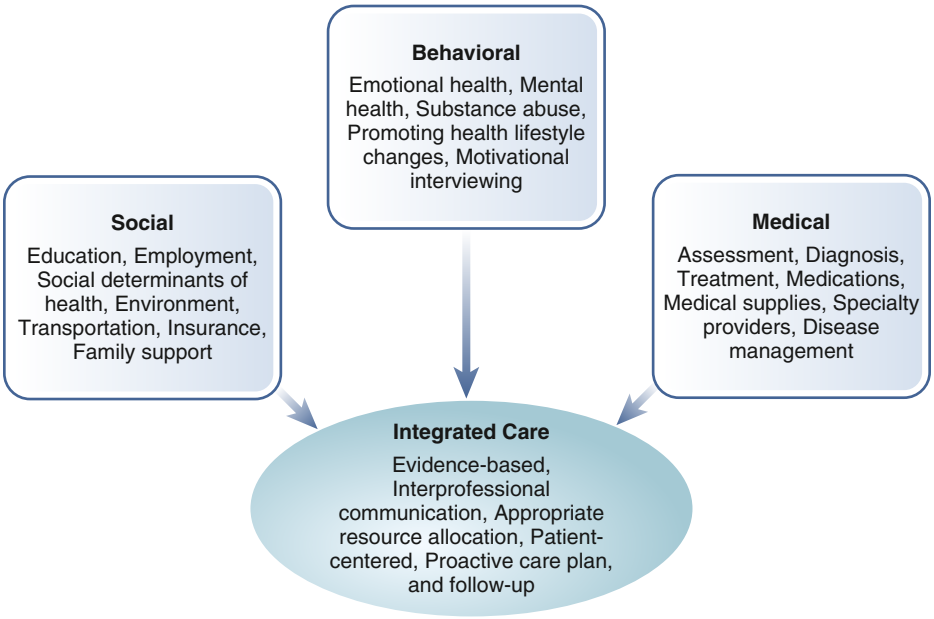
Behavioral
Emotional health, Mental health, Substance abuse, Promoting health lifestyle changes, Motivational interviewing
Social
Education, Employment, Social determinants of health, Environment, Transportation, Insurance, Family support
Medical
Assessment, Diagnosis, Treatment, Medications, Medical supplies, Specialty providers, Disease management
Integrated Care
Evidence-based, Interprofessional communication, Appropriate resource allocation, Patient-centered, Proactive care plan, and follow-up

Fig. 50.2 An Ideally Functioning Integrated Care Coordination Model.

Wellness Program (RHWP) is a community-based, interprofessional care coordination model designed to complement primary care by addressing social determinants of health along with health and wellness needs of medically complex individuals. The wellness program is delivered on-site for adults in low-income housing and incorporates an academic–community partnership that allows for integration of student learning while providing both faculty and clinician support. Conceptually, the experience of care is focused on the resident, allowing the interprofessional healthcare team to surround them with evidence-based assessments, home visits, assistance with access to healthcare services, health promotion and disease prevention education, and provision of service-related programs to address social determinants of health (i.e., legal support, financial planning, food security).[19] Program evaluation shows promising results and focuses on healthcare utilization (i.e., emergency department visits and hospital admissions), knowledge gains of students (i.e., motivational interviewing, diabetes, hypertension and frailty), and student perceptions of interprofessional practice.[20]

The transitional care model (TCM) designed by Naylor is an example of a nurse-led model of care coordination. The TCM aims to facilitate older adult patients who are transitioning from a hospital admission back to home by providing relationship-based care by an advanced practice registered nurse (APRN) in the patient's home. Although results have shown significant cost savings by decreasing hospital readmissions, barriers to implementation include reimbursement for such services.[21,22] Core components of the TCM include screening to identify high-risk patients, a relationship-based approach that involves collaborating with the patient, caregiver, and the healthcare team, fostering continuity of care by identifying one point of contact (i.e., the APRN), identification of risk factors, and education that promotes skills in self-management.[23]

Integrated Models

Models committed to the integration of health care, social support, and community clinical and nonclinical services are still evolving. Integrated models offer significant promise for supporting holistic, patient-centered, family-focused care, but building bridges between services and settings is fraught with barriers. In the United States, most challenges stem from having different service types financed from different sources. Coordination is further complicated by the scope of authority for managing the different services and the level of involvement of each agency or organization. An example is the need to coordinate services across community programs supported philanthropically, social services supported with government financing, and medical services supported by a health system. It can also be difficult to determine the setting in which the coordination should reside and ultimately the relationship or nature of the partnership that should exist between agencies and service organizations. Fully integrated models need to be able to coordinate a full range of services across settings and over time; they should also be funded and financed by different entities and inclusive of service providers (both clinicians and nonclinical community leaders), patients, and their caregivers.

An evolving example of an integrated model that has gained national support is the patient-centered medical home (PCMH), which notably incorporates five specific functions: comprehensive care from an interprofessional healthcare team; patient-centered care that appreciates each patient's unique needs and supports self-management goals; coordinated care that assists patients with access to the healthcare system and community services; accessible services that allow patients timely access to the healthcare team; and a commitment to quality and safety improvement initiatives through the use of evidence-based care and performance measurement.[24] A well-documented example is the Program of All-Inclusive Care for the Elderly (PACE).[25] The PACE program uses an

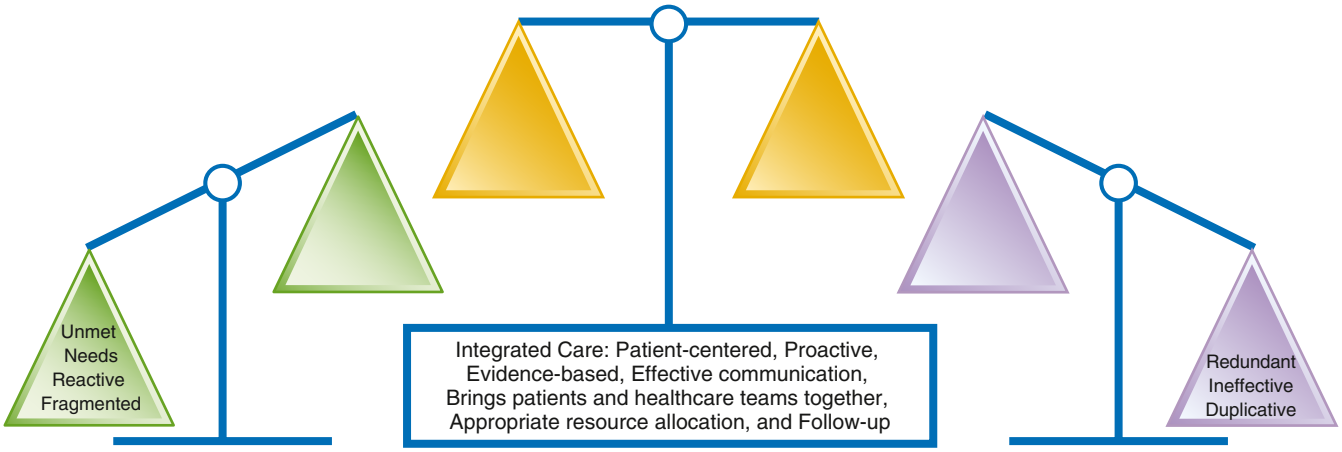

Fig. 50.3 Balance and Imbalance of Care Coordination Attributes.

interdisciplinary team to provide comprehensive services and integrates both acute and long-term healthcare and social services. Working in contract with Medicare and Medicaid, the program is designed to support people age 55 years or older who qualify for admission to a nursing home but prefer to continue residing in the community.[25]

Additionally, accountable care organizations (ACOs) receive national support as a means to provide integrated high-quality care coordination services by "*assign(ing) responsibility for a population of patients to healthcare providers, with payments depending on the cost and quality outcomes for that population.*"[26] The population of patients served by the ACO will determine the types of healthcare partnerships needed to best meet the clinical needs, and so ACOs will vary in composition. Potential healthcare settings that may become part of the ACO include preventive care, behavioral health, primary care, acute care, and postacute care.[26] It is important to note that the need for primary healthcare settings to provide integrated mental health care, behavioral health, and substance abuse has been well documented,[27] and the PCMH and ACO models are in position to address this integration.

Role of Nurse in Care Coordination

The nurse's role in effective care coordination is essential to healthcare and must include use of evidence-based guidelines with consideration of best practices, particularly during transitional care. Additionally, the nurse must use skills in comprehensive assessment to inform creation of the patient care plan and to assist in goal setting. Patients must be taught how to self-manage their chronic conditions with a special emphasis on medication management. When care coordination programs are implemented, the nurse must be able to guide structure of the intervention and implementation, followed by program evaluation to show both improved quality of patient care and assessment of healthcare utilization with associated costs. The nurse will use information technology to enhance communication among the interprofessional healthcare team members and between the patient and healthcare team.[18] The ANA advocates the need for compensation for high-value care coordination, and recommends that nurses be included in designing and testing measures that support care coordination.[2] Effective care coordination will be obvious when improved patient outcomes are achieved. Necessary skills of the care coordinator include effective management of populations, skill in a variety of communication styles in order to effectively lead and work with interprofessional healthcare teams, and the ability to provide patients and caregivers with coaching and education regarding self-management, all while linking patients and families to community resources. Additionally, care coordinators must have a working knowledge of health insurance and various methods of payment. The care coordinator should also possess basic skills in research and evaluation to be able to justify the role and contribute to the body of science by disseminating findings of program outcomes.[17] Above all, the nurse must document care coordination activities so as to show justification for the role.[6,8]

INTERRELATED CONCEPTS

Care coordination is a generic term that is sometimes used interchangeably both with specific types, such as case or disease management, and with related concepts that share a subset of defining attributes. The most closely related concepts and the ways they distinctly differ from care coordination are discussed here and illustrated in Fig. 50.4.

At the center of the care coordination is the patient. Patient factors affecting care coordination are shown at the top in Fig. 50.4. These concepts influence care coordination at the individual level and are affected by both personal and interpersonal situations; they include **Functional Ability**, **Development**, ability for **Self-Management**, **Family Dynamics**, and the influences of **Culture**. Concepts shown at the bottom of Fig. 50.4 are those related to care coordination at a community and systems level. Delivery of care is influenced and associated with **Health Care Quality**, **Evidence**, **Technology and Informatics**, **Communication**, **Person-Centered Care**, and **Collaboration**. Access to care is determined in part by **Health Policy**, **Health Care Law**, **Health Disparities and Health Equity**. Additional concepts at the systems level include **Health Systems**, **Health Promotion**, **Patient Education**, and **Safety**. Each concept is associated with care coordination at either the individual or the systems level and guides implementation and outcomes.

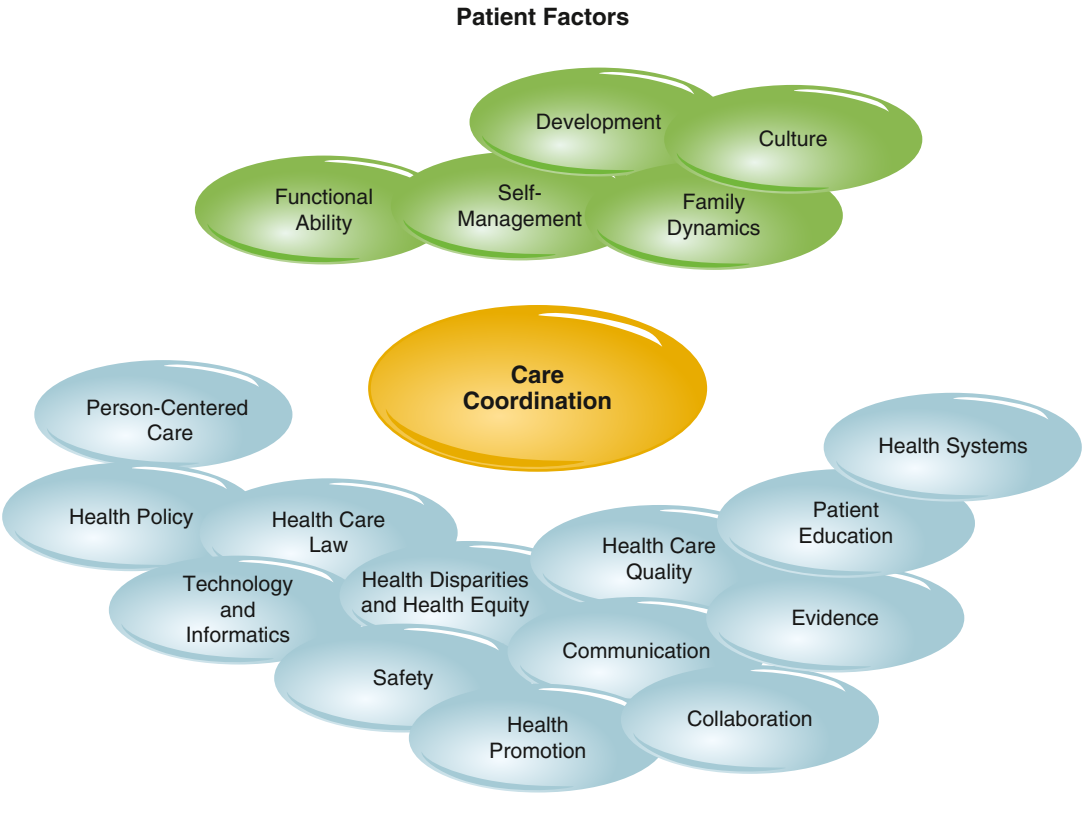

Fig. 50.4 Care Coordination and Interrelated Concepts.

CLINICAL EXEMPLARS

The need for care coordination can be seen across the life span, ranging from simple plans involving just the patient and primary care provider to complex plans involving a team of specialized healthcare services in multiple locations. Box 50.2 presents a variety of exemplars associated with care coordination. These featured exemplars provide insight on clinical conditions and situations associated with care coordination.

Featured Exemplars

High-Risk Pregnancy

Pregnant women who have a high-risk pregnancy require more monitoring to promote the best possible outcome. Care coordination may include patient education, dietician or nutritionist referral, and coordination of specialty testing. A social work consult may be necessary for Women, Infants, and Children (WIC) and Medicaid program initiation.

Preterm Infants

Preterm infants typically have a myriad of needs. Depending on gestational age, preterm infants may be born with problems associated with breathing, feeding, temperature regulation, heart, brain, blood, and immunity. Care coordination may include specialty care, home health nursing or private duty nursing, family teaching, and social support.

Special Needs Children

Children with medical complexity will ideally have a pediatric medical home with access to an interprofessional healthcare team to help coordinate their care needs and reduce fragmentation. In addition to the medical team, social workers connect patients to benefits and resources, pharmacists provide medication reconciliation, dietitians assist with nutritional needs, and parent advisors help implement collaborative goals.[28] Common conditions include congenital anomalies, autism, cerebral palsy, muscular dystrophies, cystic fibrosis, Down syndrome, epilepsy, learning disabilities, intellectual disabilities, hearing loss, speech disabilities, and visual disabilities.

Frail and Older Adults

Frail and older adults spend the most healthcare dollars per capita. According to the National Council on Aging, 80% of Medicare beneficiaries have at least one chronic disease, and 70% have two or more. Additionally, caring for chronic diseases accounts for 66% of healthcare-associated costs.[29] The frail and the elderly are vulnerable to negative outcomes after falls and serious illness, making this population ideal for care coordination to prevent such events and to assist with aging in place so as to avoid unnecessary institutionalization.

Transitional Care

Preventing hospital readmissions through incentivized transitional care coordination is a targeted area for improvement across

BOX 50.2 EXEMPLARS OF CARE COORDINATION

Approaches to Care Coordination
- Case management
- Care management
- Discharge planning
- Integrated care
- Managed care
- Medical home
- Transitional care

Population Groups Most in Need of Care Coordination
- Children with special needs
- Disabled people
- Frail elderly
- High-risk pregnancy
- Preterm infant

Common Situations Requiring Care Coordination
- Catastrophic event
- Cancer care
- Cerebral vascular accident
- Chronic obstructive pulmonary disease
- Diabetes mellitus
- End-of-life care (hospice, palliative care)
- Heart failure
- Mental illness
- Myocardial infarction
- Substance use
- Traumatic brain injury

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

government initiatives and strategies. The Hospital Readmissions Reduction Program (HRRP) provides financial incentives to hospitals to reduce 30-day hospital readmissions in these priority areas: acute myocardial infarction, chronic obstructive pulmonary disease, heart failure, pneumonia, coronary bypass graft surgery, and total hip or knee arthroplasty.[30] Kaiser Permanente Southern California recommends a standardized discharge summary, medication reconciliation, post-discharge hotline, post-discharge phone call within 72 hours, and timely primary care or specialist follow-up less than 7 days after discharge to reduce readmission rates.[31] The Society of Hospital Medicine's Project BOOST (Better Outcomes for Older Adults through Safe Transitions) provides standardized tools for interprofessional healthcare teams to conduct risk assessment, discharge education, follow-up, and medication reconciliation to help reduce readmissions and empower patients.[31]

Mental Illness

Patients with mental illness are at increased risk of early death from treatable chronic diseases and substance use conditions; however, integrated care is lacking in the primary care setting.[27,32] Recommendations from the National Council for Mental Well-Being's Comprehensive Healthcare Integration Framework include incorporating a multidisciplinary team approach, a focus on preventing and treating chronic conditions, purposeful connection to community resources to address social determinants of health, measurement to support quality improvement, and ensuring there is financial sustainability.[33] Care coordination and self-management support are beneficial for integrating mental health and substance abuse care with primary medical care through screening, referral, and follow-up.

End-of-Life Care

End-of-life care espouses many aspects of care, including physical, psychosocial, spiritual, and cultural needs of both the patient and the family. It can be extremely costly, particularly if patient needs are not communicated or coordinated well. Hospice and palliative care can take place in all healthcare settings and in the home. Clinical guidelines of care established by the National Consensus Project for quality palliative care recommend a multidimensional and interprofessional approach to care coordination during end of life to improve quality and decrease healthcare costs.[34]

CASE STUDY

From Fuse/Thinkstock.

Case Presentation

Shane is a 5-year-old boy who is having difficulty ascending the stairs to his family's second-story apartment. After diagnostic testing, Shane's family is informed that he has Duchene muscular dystrophy. Shane receives care from a medical home, and his team consists of a pediatrician, pediatric nurse practitioner, nurse, neurologist, physiologist, physical and occupational therapists, social worker, care coordinator, Shane, and Shane's family. The primary provider, in this case an advanced practice registered nurse (APRN), oversees the team, and the care coordinator facilitates organization. Mutually agreed-upon goals include optimizing independence and attending school with his peers. The team communicates recommendations and changes in care through a patient care portal available to the medical home, inpatient, and outpatient services. This program also monitors prescriptions and provides prompts for the APRN when vaccinations and wellness activities are due.

During his initial evaluation, physical therapy makes recommendations for bracing. The social worker discusses when and how to file for social services programs such as Medicaid and disability. The social worker also contacts the local elementary school to make arrangements for bus transportation and accommodations so Shane can begin kindergarten in the fall. The care coordinator contacts the local chapter of the Muscular Dystrophy Association (MDA) for assistance with family and school support. The MDA also has supporters who assist the family's church to make the children's area accessible and help the family search for wheelchair-accessible housing within its school district. In addition, the care coordinator assists the APRN with compiling the documentation necessary for insurance approval of medications, durable medical equipment, and a physical and occupational therapy visit at the patient's home for family teaching. The care coordinator schedules a follow-up appointment in 3 months and will call Shane's mother in 3 weeks to determine whether the current plan is meeting the needs of Shane and his family.

Summer camp and sports are important activities of childhood that can be facilitated through national and community programs for children with special needs. The MDA, Special Olympics, and other charitable organizations coordinate with the family and medical team to ensure safe and appropriate activities while complying with current medical treatment. When Shane enters high school, his care coordinator will work with the medical team, family, school counselor, and support group to help Shane develop a vocational plan for transitioning from school to higher education or the workforce and for independent living. Shane will also start transitioning from pediatric to adult care during this time; because both practices are located in his medical home, the same framework for care and electronic medical records are used, easing the transition and decreasing errors.

Case Analysis Questions

1. Consider the attributes of care coordination presented earlier. Describe which attributes are evident in this case.
2. What type of care coordination model is represented by this case? What elements lead you to this assessment?

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CONCEPT 51

Health Promotion

Dana Burns

During the past century, technological advancements have resulted in dramatic changes in nearly every aspect of our daily lives—particularly in the areas of transportation, communication, food production, and food acquisition. Technological advances have afforded humans with many conveniences incomprehensible 100 years ago. Along with these advances, there have been many consequences. Over time, the lifestyles of people worldwide have changed, resulting in a largely sedentary society with epidemic rates of obesity and many other related chronic diseases. According to the U.S. Department of Health and Human Services (USDHHS), unhealthy lifestyles and unhealthy environments are responsible for a large percentage of morbidity and mortality in the United States.[1]

Early technological advances in medicine fueled an initial interest in developing improved methods for the diagnosis and treatment of disease. As societal changes occurred, it became clear that a focus on health prevention was also necessary. Thus, during the past several decades there has been a significant shift in national attention from the treatment of illness to the promotion of health.

Health promotion is a national health priority and foundational to the provision of quality care for people of all ages; it also influences health policy, economics, and distribution of resources. As the largest group of healthcare providers, nurses are central to meeting national health promotion goals through interactions with individuals, families, and communities. Health promotion is included as part of the revised definition of nursing as a standard of professional nursing practice with the American Nurses Association (ANA) and is an element in the four spheres of care with the American Association of Colleges of Nursing (AACN).[2,3] The purpose of this concept presentation is to introduce health promotion and describe how this concept is applied within nursing practice.

DEFINITION

Initially, the concept of Health Promotion may seem simple—that is, a focus on improvement of health and prevention of disease. This concept, however, is actually very complex, involving multiple dimensions. For the purposes of this concept presentation, the World Health Organization's definition is proposed: *Health promotion is the process of enabling people to increase control over, and to improve, their health.*[4] Health promotion requires the adoption of healthy living practices and often necessitates a change in behavior. For this reason, long-term success of health promotion efforts is largely dependent on effective adaptation to change. Disease prevention (also referred to as health protection) is considered a component of health promotion and refers to behaviors motivated by a desire to avoid illness, detect illness early, and manage illnesses when they occur.

To fully understand health promotion, one must have an understanding of various dimensions underlying this concept. Health promotion encompasses health, wellness, disease, and illness. First, what is meant by the term health? The World Health Organization defines *health* as "*a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity.*"[5] Despite the fact that this definition is nearly 60 years old, it remains the most popular definition of health worldwide.[6] The National Wellness Institute defines *wellness* as "*…an active process through which people become aware of, and make choices toward, a more successful existence.*"[7] Wellness refers to a positive state of health of a unique individual, family, or community. It is multidimensional, encompassing several dimensions, including physical, mental, spiritual, social, occupational, environmental, intellectual, and financial. Wellness is seen as a continually changing state ranging from high-level to low-level wellness. *Disease* is a functional or structural disturbance that results when a person's adaptive mechanisms to counteract stimuli and stresses fail.[8] Although similar to disease, *illness* is seen as the physical manifestations and the subjective experience of the individual. Illness can be present in the absence of disease, and it is possible to have no illness when a disease is present. Likewise, many individuals experience wellness in the presence of an illness. For example, a person who has type 2 diabetes (a chronic illness) can experience high-level wellness. Low-level wellness is seen as an unfavorable state in which illness may result. Throughout the years, there has been ongoing debate about the relationship between health and illness—as paired entities at opposite ends of a single continuum

or as separate entities.[6–10] The complex interrelationship of health, wellness, illness, and disease as components of health promotion would suggest the latter is a more realistic view. Fig. 51.1 shows a health–illness continuum with the variable of wellness added. From this perspective, one can appreciate the interplay of having high-level or low-level wellness in a state of health or in a state of illness.

SCOPE

Health promotion is viewed broadly as behaviors that promote optimal health across the life span within an individual, family, community, population, and environment. The scope of health promotion (Fig. 51.2) is traditionally represented through three levels of prevention, first defined by Leavell and Clark—primary, secondary, and tertiary prevention[12]—each of which are described further. An emerging fourth component to health promotion is known as *primordial prevention* (Box 51.1).

Specific recommendations for health promotion vary according to the level of prevention and the unique characteristics of an individual (e.g., age, gender or race, family history, or medical history), a community, or a population. Health promotion recommendations for population groups often are presented in the context of age groups, including infants, toddlers, school-age children, adolescents, adults, and older adults. The terms *community* and *population* refer to collective groups of people identified by geography, common interests, concerns, characteristics, or values.[13] Thus, community may be a localized area or may involve groups of people without geographic boundaries (such as a web-based support group). It is also important to recognize the entire world as a global community—meaning that events rarely occur in isolation of one country or region, so a very broad perspective of potential effect must be considered.

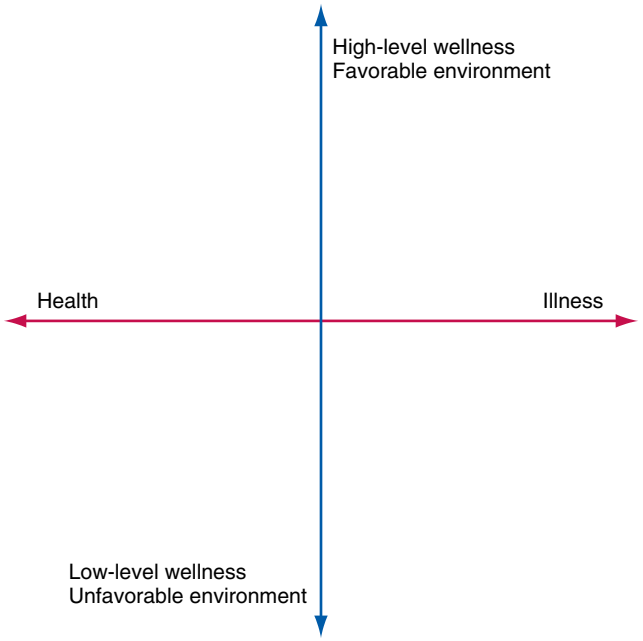

Fig. 51.1 The Interplay Between Health, Wellness, and Illness. (From Endelman, C. L., & Kudzma, E. C. [2018]. *Health promotion throughout the life span* [9th ed.]. St. Louis: Elsevier.)

Primary Prevention

Primary prevention refers to strategies aimed at optimizing health and disease prevention. The focus is on health education for optimal nutrition, exercise, immunizations, safe living and work environments, hygiene and sanitation, protection from environmental hazards, avoidance of harmful substances (e.g., allergens, toxins, and carcinogens), protection from accidents, and effective stress management. Specific health promotion strategies are not linked to a single disease entity. For example, avoiding smoking helps to promote health and reduce the individual's risk for pulmonary, cardiovascular, and immunologic disease. Also, it is important to understand that a combination of health-promoting strategies are usually advised for the prevention of specific conditions. For example, there are many known strategies that prevent or reduce one's risk for developing cardiovascular disease, including implementing a healthy diet, exercising regularly, and avoiding smoking; additional measures may be advised based on other personal risk factors.

Secondary Prevention (Screening)

The goal of secondary prevention is to identify individuals in an early state of a disease process so that prompt treatment can be initiated. Early treatment provides an opportunity to cure, limit disability, or delay consequences of advanced disease. Secondary prevention measures usually involve screening tests. Screenings are typically indicated and recommended if they are safe, cost-effective, and accurate and if the effort makes a substantial difference in the morbidity and/or mortality of conditions. Screenings are recommended for an individual, family, population, or community based on known risk factors.

To be considered accurate, a screening method must have a high degree of reliability and validity. A screening instrument, test, or method is considered reliable if the approach produces the same results when different individuals (with a similar skill

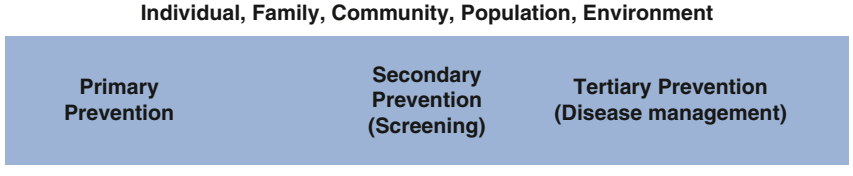

Fig. 51.2 Scope of Concept: Health Promotion. Includes three levels (primary, secondary, and tertiary) applied across the life span with an individual, family, community, population, and environmental focus.

set) perform the test. Validity reflects the ability of the test to accurately detect disease. Ideally, a screening measure will accurately differentiate individuals who have a condition from those who do not have a condition 100% of the time. *Sensitivity* is a measure related to the proportion of those with a condition who are correctly identified. A test with poor sensitivity fails to identify disease in people who actually have a condition—known as a false-negative result. S*pecificity* refers to the ability to currently identify those who do not have a condition. If a screening measure has poor specificity, many people who are disease-free will have a false-positive test result.

Tertiary Prevention

Tertiary prevention involves minimizing the effects of disease and disability; the focus of tertiary prevention is restorative through collaborative disease management. The aim is to optimize the management of a condition and minimize complications so that the individual can achieve the highest level of health and wellness possible. Specific strategies include rehabilitative efforts to increase adherence to medication, nutrition, physical activity, and other disease management strategies. Many strategies used as primary prevention strategies are also used for tertiary prevention. The difference is not the strategy itself but, rather, the intent, goal, and context of the strategy. For example, aerobic exercise is used as a primary prevention strategy to maintain health, but it may be a specific weight loss intervention for the obese patient or a rehabilitation strategy after an acute myocardial infarction.

ATTRIBUTES AND CRITERIA

Attributes are qualities, characteristics, or elements that validate parameters of the concept. Health promotion is characterized by four elements:

1. ***Optimization of health:*** The focus on optimizing health includes measures to maintain high-level wellness, measures to prevent illness, and strategies for early detection and management of disease when it occurs.
2. ***Evidence:*** Health promotion guidelines are based on evidence; for this reason, recommendations are periodically updated to reflect new knowledge generated through research efforts. The recommendations are usually disseminated through practice guidelines for health professionals and via consumer-targeted media for the general public. In many cases, recommendations are presented as a matter of priority based on the level of evidence. For example, the U.S. Preventive Services Task Force (USPSTF) has five levels of evidence; each recommendation statement is accompanied by a recommendation grade that ranges from A to D or grade I (Box 51.2). As applied to two examples of cancer screening, USPSTF recommends biennial mammography screening for women aged 50 to 74 years (grade B recommendation)[14] and recommends selectively offering periodic prostate-specific antigen (PSA) for men 55 to 69 years old based on patient preferences (grade C recommendation) and is against routine PSA-based screening for prostate cancer in men 70 years and older (grade D recommendation).[15]
3. ***Patient/community centered:*** Incorporation of health promotion measures must be valued and desired by the individuals affected. On an individual level, personal motivation to incorporate the strategies is required. On a community level, leadership from individuals within the community is needed for successful implementation. It is critical that the wishes and desires of the targeted individual(s) are considered and understood. It is recommended that a patient/family/community baseline assessment be done in order to gain an understanding of the wishes and desires of the individual(s) affected.[6]
4. ***Enculturation:*** Designing and implementing health promotion require cultural competence and sensitivity to differences among cultures. Nurses need to be willing to listen to and learn from patients and communities so that interventions are provided within appropriate languages and within the context of health belief practices.[6] Often, healthcare providers make recommendations for actions from their own

BOX 51.1 What Is Primordial Prevention?

Primordial prevention consists of risk factor reduction targeted toward an entire population through a focus on social and environmental conditions via laws and national policy. Primordial prevention represents the earliest health promotion modality, targeting the underlying stage of natural disease by addressing negative social conditions that prompt disease onset. As one example, improving access to safe sidewalks in an urban neighborhood promotes physical activity and, therefore, decreases risk factors for obesity, cardiovascular disease, and type 2 diabetes.

From: Gillman, M.W. (2015). Primordial prevention of cardiovascular disease. *Circulation, 131*, 599–60. https://doi.org/10.1161/CIRCULATIONAHA.115.014849

BOX 51.2 U.S. Preventive Services Task Force Grading

Grade A = Recommends
There is high certainty that the net benefit is substantial.

Grade B = Recommends
There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.

Grade C = Selective Recommendation
There is moderate certainty that the net benefit is small. There may be considerations that support providing the intervention for an individual patient depending on individual preferences and circumstances, but not for the general population.

Grade D = Recommends Against
There is moderate or high certainty that the intervention has no net benefit or that the harms outweigh the benefits.

I Statement = Insufficient Evidence to Recommend for or Against
The current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.

From U.S. Preventive Services Task Force. (2013). *Grade definitions.* Retrieved from https://www.uspreventiveservicestaskforce.org/Page/Name/grade-definitions#grade-definitions-after-july-2012

perspective of what is appropriate and expected behavior—an ethnocentric perspective based on their own set of values and beliefs. Enculturation refers to the full internalization of values of a culture group. To be successful, health promotion plans incorporate the beliefs, attitudes, values, behaviors, and interpersonal dynamics into the planning, implementation, and evaluation of health promotion activities.

THEORETICAL LINKS

Numerous models and theories of health, health behavior, and health promotion have evolved during the past 30 years as the science and evidence of health promotion have expanded. Two areas of health promotion models include those focusing on the individual as a patient and those focusing on the community.

Individual-Focused Models

Models that focus on the individual typically share common themes, including cognition, decision making, motivation, behavior, and environment. Although it is beyond the scope of this concept presentation to detail all the models and theories associated with health promotion, some of the most prominent, contemporary models are presented in Table 51.1.

Community-Focused Models

True community interventions focus on the community as a whole or the majority of the population within a community; this is in contrast to the application of interventions to individuals within a community. Community-focused models share common attributes, including (1) a focus on community values and norms, (2) legitimization of desirable behaviors and environmental changes, (3) participation of community leadership, and (4) a planned change in which community members have control.[16] A number of community-focused models exist for planning and dissemination of health promotion agendas; a few of these are presented in Table 51.2.

TABLE 51.1 Models of Health Promotion Targeting the Individual

Model name and theorist	Brief description
Health promotion model (Pender)	This model shows that healthy behaviors (behavioral outcomes) are influenced by integration of unique characteristics and experiences of an individual (prior behavior and personal factors) and by influences of behavior (perceived benefit and barriers to action, perceived self-efficacy, activity-related affect, and interpersonal and situational influences).
Transtheoretical model (Prochaska and DiClemente)	This model proposes that health-related behavior progresses through six stages of behavior change on a continuum from motivational readiness to change of a problem behavior. The six stages are precontemplation, contemplation, preparation for action, action, maintenance, and termination. These changes occur regardless of specific behavior change and have been observed both among individuals adopting healthy behaviors and among those stopping an unhealthy behavior (e.g., smoking).
Theory of reasoned action and planned behavior (Ajzen and Fishbein)	This theory is built on an understanding of attitudes and subjective norms and the influence these have on changes in behavior. According to the model, the intention to change is driven by the attitude toward the behavior and the subjective norm for the behavior.
Social cognitive theory (Bandura)	This is a social cognitive theory used to design individual behavioral change. Self-belief influences behavior; self-beliefs are formed through self-observation and self-reflection. The major concepts within this theory are self-direction, self-regulation, and self-efficacy.
Health belief model (Stretcher and Rosenstock)	This model explores behaviors of individuals who take actions to avoid illness and those who fail to take preventive actions and, thus, has been used to predict which individuals would or would not use preventive measures.

CORE COMPETENCIES

Health Promotion

- Integrate evidenced-based knowledge from nursing and other sciences as it relates to Health Promotion.
- Perform a clinically relevant assessment to identify opportunities for health-promoting behaviors.
- Using a person-centered approach, collaborate with the patient and their family to establish mutual goals related to health promotion.
- Educate individuals and families regarding self-care for health promotion and illness prevention.

CONTEXT TO NURSING AND HEALTH CARE

Nurses have involvement in health promotion on a number of levels, including working with an individual or family to enhance health, working with communities and organizations to enhance health, and participating in the development and implementation of health policy. The most common roles of nurses include the assessment, planning, and implementation of interventions and the evaluation of health promotion strategies for individuals. In fact, nurses have a significant responsibility for enhancing the health of individuals across the life span; this occurs in the context of a therapeutic relationship and requires skillful communication by the nurse.

National Healthcare Agenda and Healthcare Economics

Health promotion is a central focus of healthcare delivery that has been shown to add quality years of life and to decrease healthcare costs.[6] National goals and objectives for improving the health of Americans have been outlined in a series of reports beginning in 1979 with the publication of the first of the Healthy

TABLE 51.2 Models of Health Promotion Targeting the Community

Model name and theorist	Brief description
Social ecology models	These are models that emphasize social and cultural contexts of people within an environment—and recognition of multiple variables that influence health behaviors. Consideration for health promotion interventions includes an integration of environmental resources and lifestyles of individuals within that environment.
PRECEDE-PROCEED model (Green)	This is a nine-stage model designed to guide the planning to health programs by identifying the most appropriate intervention strategies. PRECEDE stands for *p*redisposing, *r*einforcing, *e*nabling *c*onstructs in *e*cosystem, *d*iagnosis, and *e*valuation. PROCEED recognizes forces outside the control of individuals and stands for *p*olicy, *r*egulation, *o*rganizational *c*onstructs in *e*ducation, and *e*nvironmental *d*evelopment.
Diffusion of innovations model (Rogers)	This is a model that emphasizes dissemination of health behavior interventions. Rogers' model identifies four steps of diffusion: (1) the innovation, (2) communication channels (spreading the word), (3) time, and (4) social systems. The underlying assumption of adoption is the perceived value placed on the new behavior or innovation.
Social marketing models	Social marketing models influence behavior change by influencing adoption of an idea by the general public. Foundational to social marketing models are product, price, place, and promotion. When applied to health promotion, the "product" is the desired application, the "price" is the cost (social and economic) to the community as a result of adoption, "place" refers to the location where the program(s) is available, and "promotion" refers to strategies used to entice individuals to accept the change through adoption.

People series (*Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*) and a companion document published in 1980 (*Promoting Health/Preventing Disease: Objectives for the Nation*). Since that time, the USDHHS has published reports every 10 years outlining goals and objectives for the upcoming decade. The Healthy People 2030 framework outlines five overarching goals for the nation to achieve by 2030; these goals are presented in Box 51.3. The five goals link to 41 topic areas, each with a set of objectives and target indicators to measure progress.[17]

The support for health promotion and illness prevention services is also demonstrated through the changes in coverage for such interventions by third-party payers. The impact of providing such services is continually evaluated; to maintain support, the cost of providing such services (including to those who are uninsured or underinsured) must outweigh the consequences of the absence of such services, particularly in the face of rising healthcare expenditures. Such issues have been central to health policy debate.

BOX 51.3 Overarching Goals for *Healthy People 2030*

1. Attain healthy, thriving lives and well-being, free of preventable disease, disability, injury, and premature death.
2. Eliminate health disparities, achieve health equity, and attain health literacy to improve the health and well-being of all.
3. Create social, physical, and economic environments that promote attaining full potential for health and well-being for all.
4. Promote healthy development, healthy behaviors, and well-being across all life stages.
5. Engage leadership, key constituents, and the public across multiple sectors to take action and design policies that improve the health and well-being of all.

From U.S. Department of Health and Human Services: *Healthy People 2030 Framework*. Accessed at https://www.healthypeople.gov/2020/About-Healthy-People/Development-Healthy-People-2030/Framework

Vulnerable Populations and Health Disparities

Vulnerable populations refer to groups of individuals who are at greatest risk for poor health outcomes. These people are more likely to develop health-related problems and experience significantly worse outcomes when they occur. *Health disparities* is a term (and a concept presented in this textbook) that refers to inequities in health within vulnerable population groups. Vulnerable populations are often politically marginalized in society; they experience discrimination and intolerance and may not have their basic human needs met. The most consistent predictor of life expectancy, morbidity, mortality, and nearly all indicators of health status is low socioeconomic status,[18,19] although race/ethnicity, education, and occupation are also powerful indicators. Thus, two of the most highly vulnerable populations are persons with low socioeconomic status and persons who are members of ethnic and racial minorities. Health policy to eliminate health disparities aims to increase accessible health services, requiring community involvement. Cultural competence is especially important to the elimination of health disparities because it facilitates integration of culturally appropriate interventions based on the values and beliefs of the targeted group. Thus, before working with vulnerable populations, nurses must be committed to developing skills in cultural competence.[20]

Assessment

Health assessment is the foundation for establishing a health promotion plan and the basis for application of health promotion into practice. Assessment can target an individual, family, or community.

Individual Assessment

The primary components of assessment for individuals include a comprehensive assessment of health status, health behaviors, and risk. Advances in genetic research have enhanced the ability to assess risk; thus, family history is a critical component of health assessment. In addition, assessment includes gaining an understanding of personal factors such as health preferences, values, and social relationships. The assessment of health is

performed by nurses in nearly all settings and includes conducting a history and physical examination. Effective communication skills are essential to obtain necessary information for a successful health promotion process. The nurse–patient relationship is truly the context of care; the nurse must be sensitive to each person's goals and values.

Family Assessment

A family assessment is necessary to promote health within families. Family assessment includes gaining an understanding of health promotion and disease prevention activities within the family (including risk factors), family strengths, and the relationships among family members—how family members influence behaviors and decision-making of others. A genogram is a useful method to understand family members across multiple generations.[21]

Community Assessment

Community assessment is a necessary component of assessment when developing community-based health promotion strategies—usually in the context of community health nursing and public health nursing. Community assessment is conducted in participation with community representatives and through community data collection strategies including observation, interviews from community residents, and data collection using instruments that quantify data. Additional information about a community typically incorporated into an assessment includes the structure of a community; census; population/demographic statistics; morbidity rates; mortality rates; epidemiologic data; environmental data (e.g., pollution indices); and community resources such as healthcare services, government services (fire, police, and other emergency services), schools, and other local government agencies. These data can be collected from a variety of sources, including the Internet and city/government offices.

Health Promotion Interventions

Health promotion interventions are planned and initiated on the basis of data gained from assessment. Guidelines for health promotion interventions based on age or other risk factors are readily available for health professionals; nurses should know how to access and interpret the guidelines so these can be incorporated into patient care. The interventions described here are broadly applied to all levels of health promotion (primary, secondary, and tertiary) and can be applied to all targeted groups (individual, family, and community).

Education

Education is a cornerstone for health promotion; this is also one of the most important contributions of nursing. Education intersects with each area of health promotion—as a primary, secondary, and tertiary health promotion strategy. Education is applied to individuals (patient education), families, and communities. Nurses have an opportunity to assist individuals to optimize their health by educating individuals and families about healthy lifestyle choices and encouraging appropriate screening and management of disease when necessary. Teaching involves not only providing information but also helping to align resources and access so health services can be provided. This is especially important among individuals from vulnerable populations.

Vaccinations

Edward Jenner is credited with being the father of immunology because he was the first person to successfully develop a vaccination in 1798. At that time, the smallpox vaccine was a new and innovative way to prevent disease and provided the foundation for the science of immunology. Since that time, vaccinations have become one of the most effective primary prevention interventions; development and research efforts for new immunizations are ongoing. Nurses are commonly involved in this area of health promotion by providing patient education regarding immunizations, allaying fears of immunization, identifying those who are in need of immunization, and administering vaccines. Vaccinations are recommended for individuals across the entire lifespan from infancy through geriatric populations. Although it is beyond the scope of this concept presentation to describe all vaccinations, nurses should know where to find and interpret current immunization guidelines. The Centers for Disease Control and Prevention (CDC) provides regular updates to recommended immunization guidelines for all age groups and is readily found on the website (http://www.cdc.gov).[22]

Screening

Screening is a secondary prevention strategy; the goal is for disease detection in the early stages of the disease process. Screening usually involves testing that has high reliability and validity—and screens for important conditions in which early detection is paramount. The benefits must outweigh the consequences and must be feasible from an economic and resource perspective. Specific routine screening guidelines have been developed for individuals across the life span. The USPSTF offers reliable screening recommendations, as do many other government agencies and organizations such as the CDC, the American Cancer Society, the American Heart Association, and the American Academy of Pediatrics. Screening is also done based on an individual's risk. Genetic screening, for example, is not routinely performed on all individuals, but it is indicated in cases in which the history supports the need.

Nutritional Health

It is estimated that more than 60% of all deaths are associated with chronic diseases such as cardiovascular disease, cancer, lower respiratory disease, and diabetes[23]; a large percentage of these diseases are caused or exacerbated by poor or unhealthy nutritional behaviors. According to the National Health Statistics, the prevalence of childhood obesity is 12.7% among children between ages 2 to 5 years, 20.7% among children ages 6 to 11 years, and 22.2% among children and adolescents ages 12 to 19 years.[24] Obesity is more common in minority and vulnerable populations; 26.2% of Hispanic children, 24.8% of non-Hispanic Black children, and 16.6% of non-Hispanic White children have obesity.[24] Children who are overweight or obese are at significant risk for many health-related problems as adults. For these reasons, one of the most important health promotion interventions is nutrition counseling.

The *Dietary Guidelines for Americans 2020–2025* provides the basis for dietary recommendations and guides state and federal policies related to nutrition. A consumer-friendly version, *ChooseMyPlate* (http://www.choosemyplate.gov), serves as a useful tool for dietary teaching and planning.

The promotion of an adequate diet is included in nearly all health promotion plans—either as a primary or as a tertiary prevention focus. For example, a healthy individual whose weight is within normal range may set a goal to increase the servings of fruits and vegetables consumed each day to meet the dietary recommendations found on ChooseMyPlate. Another individual who is obese and has cardiovascular disease may reduce saturated fats and calorie consumption as a treatment measure with a goal to reduce weight and decrease levels of serum lipids. In addition to improving dietary intake, other topics related to nutrition include dietary supplements, food safety, and nutritional screening.[6]

Physical Activity

The human body was designed to move; therefore, it should be no surprise that regular physical activity is an essential component of maintaining optimal physical and psychological health. Physical activity encompasses any bodily movement involving skeletal muscles and energy expenditure. Physical activity occurs as part of routine daily activities, occupational activities, and recreational activities. Exercise training (purposeful bodily movement with the intention to improve physical fitness) is recommended for individuals across the life span and also is an important component to maintaining a healthy weight.

The benefits of physical activity are well documented for individuals across the life span. According to the USDHHS, there is strong evidence that regular physical activity among children and adolescents results in improved bone health, improved cardiorespiratory and muscular fitness, improved cardiovascular and metabolic health biomarkers, and increased favorable body composition.[25] For adults and older adults, there is strong evidence that regular physical activity lowers the risk for multiple conditions, including coronary heart disease, stroke, hypertension, elevated lipids, type 2 diabetes, metabolic syndrome, breast and colon cancers, weight gain, and depression.[25] There is also a reduced risk for falls and improved cognitive function. In addition to being a primary prevention strategy, physical activity and exercise are also common tertiary health promotion interventions. Examples include physical activity as part of cardiac rehabilitation, physical activity after a stroke, and physical therapy after joint replacement surgery.

Pharmacologic Agents

In addition to immunizations, many pharmacologic agents are useful for health promotion efforts. Details of drugs are primarily discussed in specific concept chapters, but two common examples are provided here.

Drugs Used for Smoking Cessation. Several U.S. Food and Drug Administration (FDA)–approved medications are available to assist smoking cessation. Most of these drugs are nicotine replacement therapy for short-term use to reduce nicotine craving and provide relief of symptoms from nicotine withdrawal. These are available in the form of patches, gums, or lozenges.[26]

Drugs Used for Weight Loss. There are several FDA-approved medications for weight loss. Most drugs are used to reduce appetite by making the patient feel full and several (phentermine, benzphetamine, diethylpropion, and phendimetrazine) are only for short-term use (up to 12 weeks) as appetite suppressors. Over the past several years several new medications have become available to treat overweight and obesity (including naltrexone-bupropion [Contrave], liraglutide [Saxenda], and semaglutide [Wegovy]) and have demonstrated very promising weight loss results.[27]

INTERRELATED CONCEPTS

Several important concepts interrelated with health promotion are presented in Fig. 51.3. Health promotion actually is linked to every health and illness concept within this book as a matter of prevention, screening, or tertiary care. One of the attributes of Health Promotion, noted previously in this concept presentation, is **Person-Centered Care**; this also represents an important interrelated concept. Interrelationships with the health and illness concepts **Nutrition** and **Mobility** are especially important based on the health promotion interventions discussed in the previous section. Healthcare recipient concepts **Development**, **Culture**, and **Self-Management** are interrelated and form a concept cluster; these affect the type of health promotion interventions and approaches offered, as well as factors that influence the success of behavior change. Self-management is particularly important in the area of disease management.

Patient Education, a professional nursing concept, is based on patient attributes and significantly influences the success of health promotion interventions. Recommended health promotion guidelines are based on **Evidence**, and the effectiveness of health promotion recommendations is evaluated. Because of evidence, health promotion guidelines are implemented through **Health Policy**. A significant amount of evidence exists showing the connection between **Health Disparities and Health Equity** among vulnerable populations, thus underscoring the need for measures to enhance health promotion access and practices. These concepts form a natural concept cluster (see Fig. 51.3). Health promotion is also interrelated to **Health Care Economics**. The delivery of health promotion interventions must be financed, and these interventions should be cost-effective.

CLINICAL EXEMPLARS

Considering the recommendations across the life span, there are literally thousands of exemplars for health promotion. Box 51.4 presents some of the most common exemplars of health promotion for individuals. Major exemplars for the promotion of health for individuals are often considered in terms of primary prevention, secondary prevention, and tertiary prevention. Box 51.4 is not comprehensive and does not include community or environmental health promotion strategies. Specific details for all exemplars presented can be found in multiple textbooks and on many websites devoted to health promotion.

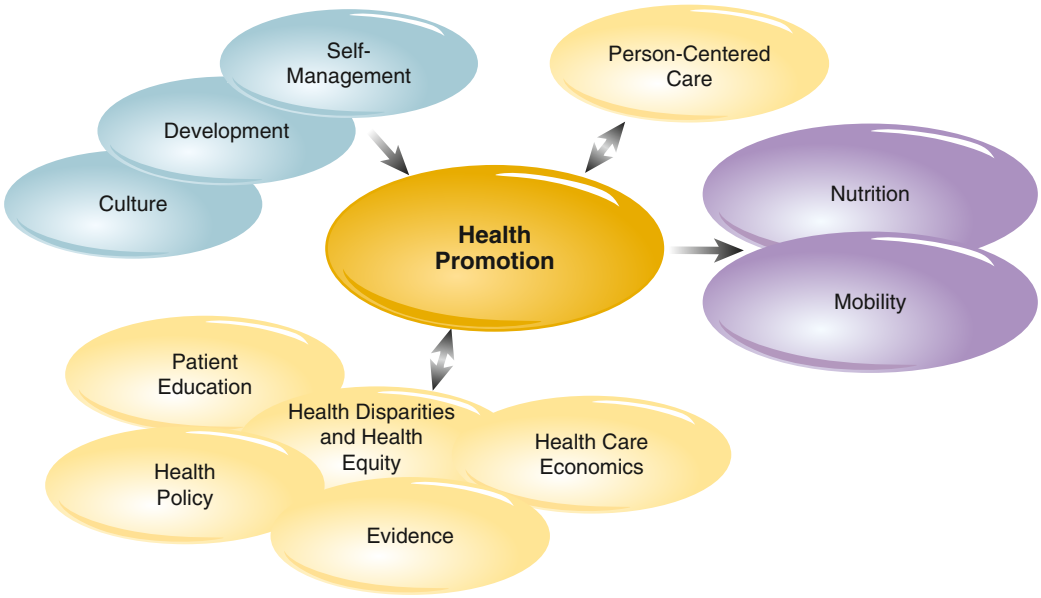

Fig. 51.3 Health Promotion and Interrelated Concepts. Interrelationships among healthcare recipient concepts (in blue), health and illness concepts (in purple), and professional nursing concepts (in yellow).

BOX 51.4 EXEMPLARS OF HEALTH PROMOTION

Primary Prevention

Prenatal

- General prenatal care
- Folic acid supplementation
- Vaccinations (e.g., rubella, hepatitis B)
- Abstinence from smoking, alcohol, and other drugs
- Nutrition counseling
- Genetic counseling

Infants/Children/Adolescents

- Injury prevention (e.g., car seats, seat belts, helmets, life jackets)
- Environmental exposures (toxins/poisoning)
- Vaccinations (health protection)
- Physical activity
- Nutrition counseling
- Avoidance of smoking and other substance use
- Dental/oral care

Adults/Older Adults

- Injury prevention (e.g., safety belts, fall prevention measures)
- Physical activity
- Nutrition counseling
- Vaccinations

Secondary Prevention (Screening)

Prenatal

- Ultrasound screening
- Rh factor and antibody screening
- Sexually transmitted infection screening

Infants/Children/Adolescents

- Developmental screening
- Hearing screening
- Vision screening
- Body mass index screening
- Blood pressure screening
- Depression screening
- Substance misuse screening

Adults/Older Adults

- Hearing screening
- Vision screening
- Body mass index screening
- Blood pressure screening
- Depression screening
- Substance abuse screening
- Blood lipid screening
- Cognitive function screening
- Functional assessment screening
- Cancer screenings (e.g., breast, colon, prostate, skin, oral)

Tertiary Prevention

Prenatal

- Diabetes management
- Hypertension management
- Substance use/abuse management

Infants/Children/Adolescents

- Chronic disease management
- Obesity management
- Nutrition counseling
- Physical activity

Adults/Older Adults

- Chronic disease management
- Obesity management
- Nutrition counseling
- Physical activity

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

Featured Exemplars

Vaccination

Vaccination represents standard health promotion measures for individuals of all ages. Vaccines provide immunity, or the ability to resist infection from many dangerous communicable diseases; in fact, the development of a vaccine represented an important turning point during the COVID-19 pandemic in the reduction of serious illness and death. The specific vaccines given to an individual are dependent on age, previous vaccinations, health status, medical history, lifestyle, type of employment, and travel history. Immunization schedules are available from the Centers for Disease Control (CDC) for various age groups, including infants and children, adolescents, and adults.[22]

Oral Hygiene

Oral hygiene is an important health promotion measure for people of all ages and includes brushing teeth, flossing, drinking fluoridated water, dental sealants, and regular visits to a dental care professional. Oral hygiene prevents dental caries (considered the most common chronic condition in childhood) and periodontal disease (which affects an estimated 47% of adults older than 30 years).[28] Periodontal disease is considered a risk factor in several systemic diseases such as cardiovascular disease and diabetes.[29]

Nutrition Counseling

Patient education regarding optimal dietary intake is one of the most common forms of health promotion and includes both primary prevention and tertiary prevention (disease management). Although most individuals as early as childhood are aware of the importance of eating a healthy diet, many children, adolescents, adults, and older adults have diets that are not optimal for a variety of reasons, including access to healthy foods; poor food choices; or conditions interfering with appetite, intake, digestion, or elimination.

Physical Activity

Physical activity is a fundamental health promotion measure for all individuals. Physical activity helps to control weight and improves cardiovascular health, musculoskeletal strength and agility, sleep, and mental health. Common activities include walking, running, cycling, swimming, and weight training. School-based, community-based, and employer-based programs to increase physical activity are examples of the greater awareness of physical activity as an important health promotion activity.

Blood Pressure Screening

Screening for hypertension involves regular blood pressure assessment. This is one of the most common health screenings because of its relative ease and cost-effectiveness. The USPSTF suggests office measurement blood pressure screening every 3 to 5 years for healthy adults with no risk factors aged 18 to 39 years and adult 40 years and older or with increased risk factors should be screened annually. The recommendations include diagnostic confirmation of elevated blood pressure prior to starting treatment.[30] Although it is not clear the optimal age to begin routine blood pressure screening in children, the American Academy of Pediatrics recommends annual blood pressure screening in the ambulatory setting starting at age 3 years; for children under 3, blood pressure measurements should be taken at well-child visits if they are at increased risk for hypertension.[31]

Breast Cancer Screening

Screening measures to detect breast cancer depend on an individual's age and risk factors. A clinical breast exam, conducted by a healthcare professional, involves palpation of the breasts and axilla for the presence of lumps. A mammography is a radiographic test that detects tumors in the breast tissue that are too small to feel. Magnetic resonance imaging is used among women with high-risk factors for breast cancer. The USPSTF recommends screening mammography every other year for women aged 50 to 74 years.[14]

Colorectal Cancer Screening

Colorectal cancer screening efforts focus on detecting and removing precancerous polyps in the colon and early detection of colorectal cancer. Screening measures include high-sensitivity fecal occult blood testing or fecal immunochemical test (FIT), sigmoidoscopy, colonoscopy, or CT colon. The USPSTF recommends screening for adults beginning at age 45 years (depending upon individual risk factors) and continuing through age 75 years.[32]

CASE STUDY

Case Presentation

Natalie Jemez, DNP, a pediatric nurse practitioner, works for a community-based health center. After hearing about the death of a 12-year-old boy who suffered head trauma at the local skateboard park, Natalie and her colleagues at the community center decided to initiate an injury reduction program targeting local youth and their families. Specifically, they were interested in raising awareness regarding traumatic brain injury and providing a mechanism to increase helmet use among children skateboarding, riding scooters, and riding bicycles at the city park. Natalie wrote a grant in partnership with the local school district to secure state funds for a 3-year project that would achieve four goals: (1) development of informational brochures to be mailed to the families of children attending the local schools, (2) development of an age-appropriate information video "Helmet Heads" to be shown to children within the school system, (3) providing a mechanism for parents to purchase helmets at a significant discount from a local retailer, and (4) purchasing a large number of helmets for free use (by checking

CASE STUDY—CONT'D

the helmets out at the local park service center) while children and their families are at the park.

Natalie was awarded grant funding for a 3-year project. As the program was implemented, other community stakeholders (including the local hospital, the orthopedic physician group, and the neurosurgeon physician group) became interested and provided additional funds to purchase additional protective equipment and to track data regarding use of equipment and number and types of reported injuries.

Case Analysis Questions

1. Considering the scope of health promotion in Fig. 51.2 (primary, secondary, and tertiary), what does this health promotion project represent?
2. What are the primary health promotion interventions represented in this case?

Source: monkeybusinessimages/iStock/Thinkstock.

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CONCEPT 52

Patient Education

Barbara M. Carranti

Education empowers. Patient education is no exception. Effective patient education allows patients and their families the opportunity to control their own health, reduce risk for illness, improve longevity, and enhance overall wellness. Specifically, the process of patient education allows patients and their caregivers the opportunity to improve health and take an active role in decision making regarding care and treatment through providing information.[1] Thus, patient and family engagement and understanding knowledge of the problem is critical. In addition, understanding of past behaviors toward the problem and impact of the problem on function is also an essential element of nursing assessment for the education plan.[2] The importance of patient education is supported by *Healthy People 2030.* This science-based program, in existence for more than 40 years, has used evidence to establish objectives to improve the health of Americans. Patient education is the key to achievement of the overarching goals of *Healthy People.*[3]

DEFINITION

For the purposes of this concept presentation, the definition of patient education is *"a process of assisting consumers of health care to learn how to incorporate health-related behaviors (knowledge, skills, and/or attitudes) into everyday life with the purpose of achieving the goal of optimal health."*[4] This is an intentional process whereby the patient is learning health-related information to support healthy lifestyle or behavior change. A similar term, *patient teaching,* is used interchangeably. The role of the nurse in patient education is to assist the patient in forming goals; assess patient need, motivation, and ability; plan educational interventions to achieve goals; and evaluate patient outcomes toward goal attainment. In short, nurses empower patients. This empowerment is accomplished by providing information to enhance wellness, reducing the risk for illness, and encouraging autonomy by enhancing self-care skills while maintaining a patient-centered approach.

SCOPE

As a concept, Patient Education can include provision of information in a wide range of formats and can be described from two perspectives: the delivery approach and educational domains. The process varies depending on multiple variables, including the intended outcome and the characteristics of the learner. For example, is the educational intervention intended to teach the patient a skill or impart knowledge related to a known health problem, increase the probability of successful treatment, prepare for discharge, or promote a healthy lifestyle and enhance well-being? Thoughtful consideration of intended outcomes will enhance the patient's learning by matching an approach to intended goals. The nurse determines what the patient needs to know and prioritizes accordingly.[5] The type of education offered will require that the nurse match the approach, method, and evaluation to this desired outcome.

Educational Approaches

Patient educational approaches can range from formal educational programming such as group lecture settings to informal, individualized one-on-one teaching and to self-directed learning by the patient that is facilitated by the nurse.[6] Formal patient education courses or classes are useful to address needs common to a group of patients or as individual teaching sessions. Formal courses are often taught using a curriculum/course plan with standardized content. In contrast, informal teaching often occurs in one-on-one sessions with the patient and/or family. Informal sessions may be planned or spontaneous, but they do not follow a specified formalized plan. An informal approach represents a large portion of patient education done by nurses. In fact, the majority of critical education occurs with each patient encounter when medications, diet, or treatment is explained or simply when answering questions about the patient's issues or concerns. Education results when a patient or family obtains and/or completes an educational activity independent from the nurse or other healthcare providers. Self-instruction allows the patient to learn independently through the use of modules.[6] With the influence of consumerism and the availability of information, a great deal of education can occur through self-directed learning employing written material or media (e.g., Internet and video) designed to assist the patient with information about health topics, a particular disease, treatments, or a specific skill (Fig. 52.1).

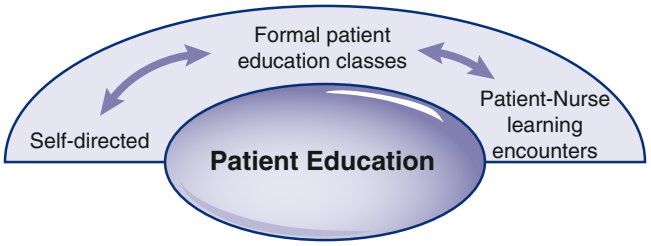

FIG. 52.1 Scope of Concept: Patient Education.

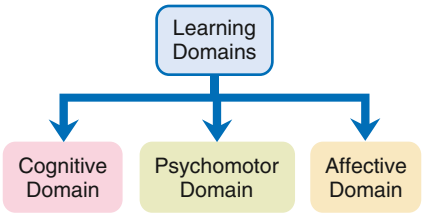

FIG. 52.2 Learning Domains.

Because of the increasing dependence on technology in all aspects of life, the use of Internet resources for patient education cannot be ignored. A majority of adults in America use the Internet to find information on many aspects of life, including health, healthy lifestyles, and treatment options.[7] This use of technology expands the role of the nurse in patient education to include teaching on evaluation of Internet sources. Patients should be encouraged to search for information sources that list authors and their credentials and contact information. The source of information should also be listed, and any photographs, charts, graphs, or other graphics should contain helpful understandable information. Any links associated with the site should be functional, active links. It is also important that patients be taught to search for government (.gov), educational (.edu), and nonprofit (.org) sites because they are considered to be the most credible sources of information. Sites chosen for use in gathering information should be secure and should clearly identify how consumers can contact a site administrator.[8] Finally, appearance of a Health On the Net (HON) code can also help the provider and consumer to identify quality health information.[9]

For this discussion of approaches to patient education to be complete, the educated and motivated consumer should be considered. Many patients will be active consumers of health information and use self-directed approaches to education. Patients may present the nurse with articles, computer printouts, and other materials gathered in an attempt to learn about health promotion, symptoms, diagnoses, and treatments. These materials can be incorporated into the nurse's assessment of the patient and the educational plan. The tendency to pursue learning opportunities addresses motivation and presents the nurse with an opportunity to ask the patient to discuss what has been learned. This also gives the nurse the opportunity to teach the patient evaluative skills, looking at sources and content of the material for credibility and reliability.[8]

Learning Domains

Patient education can also be conceptualized from the perspective of learning domains—in other words, in terms of the type of learning a patient will need. The three main domains are cognitive, psychomotor, and affective (Fig. 52.2). Education intended to increase a patient's knowledge of a subject, for example, is cognitive in nature, and using methods such as written material, lecture, and discussion is appropriate. Skill teaching or psychomotor teaching requires that the patient have opportunities to touch and manipulate equipment and practice skills. A patient who must learn to change a dressing over a wound is an example. Education that is intended to change attitudes, beliefs, or values, such as viewing the lifestyle modifications associated with the treatment of coronary artery disease as a positive change rather than a burden, is known as the affective domain in education.[10]

To illustrate this, consider an example of a patient with a new diagnosis of a degenerative neurologic disorder that will require the patient to self-catheterize. The nurse will need to teach the patient the complex *psychomotor* skill of self-catheterization, and the teaching will be successful when the patient is able to competently demonstrate this skill. Part of this teaching will include physiologic information designed to enhance the patient's understanding of the necessity of this procedure (*cognitive* learning) as well as assistance with lifestyle alterations and coping to help the patient to adapt and continue to live fully (*affective* domain).[10]

ATTRIBUTES AND CRITERIA

For successful patient education to occur, there must be an identified need for learning. Although this need may be identified by the nurse, learning will not occur without readiness on the part of the learner. Ultimately, it is patient motivation that determines when, how, and if patient education will occur.[5] In addition to having an identified need, there are three additional major attributes associated with the concept of Patient Education:

1. Planning is involved.
2. The outcomes are goal oriented.
3. The patient is motivated to learn.

Like any other teaching-learning process, patient education requires that the teacher (nurse) know the intended audience and plan appropriately. This is a process that must be in place even in the most routine patient encounters. There must also be a goal, which is usually a change in behavior or attitude of some sort. The learners (patient and/or significant other) not only should be identified as the target of the teaching plan but also should be motivated by the outcome of the behavioral or attitudinal change. The nurse then develops the plan and evaluation to be consistent with the patient's needs.

The nurse must determine the overall appropriateness of patient education. This requires asking, "Is the timing right, are the involved parties ready, and are the goals clear?" Only after these answers are determined can true education of the patient occur.

THEORETICAL LINKS

The goal of all patient education is to produce change. It is helpful to examine theories of behavior and learning in addition to nursing theory to understand patient need and motivation to change.

Theories of Health Behavior

The health belief model is used to help explain individual decisions to use health behaviors and screening opportunities. It has been adapted many times to explain compliance and behavior as they relate to health.[11] According to the health belief model, individual perceptions of susceptibility to and severity of disease are the primary motivators for making attempts to change health behavior. These motivators are modified by demographic, social, psychological, and structural variables that may heighten or dampen motivation. The primary motivation of patient perception then allows the patient to be open to cues to act, which of course leads to patient education opportunities.[11] For example, a patient who is aware that her risk for breast cancer is high because of genetics may be likely to participate in some form of education about risk for the disease. This education can enhance the patient's knowledge level to produce lifestyle changes that reduce risk. Put another way, the health belief model states that for an individual to change behavior related to health and wellness, there first must be a belief that illness can be avoided and that taking a particular action can reduce risk. Furthermore, the individual must believe that he or she is capable of making the needed change.

Nola Pender's health promotion model (HPM), developed in 1987 and revised in the late 1990s, is a model that "describes major components and variables that influence health promoting behaviors."[11] The HPM is based on the health belief model that was expanded by Pender to include factors that can influence the patient's motivation to change behavior, such as previous experience with behavior changes to address the problem, and the patient's perception of success in these attempts. This model also expands the view of patient motivation by including social supports and competing priorities as factors to consider.

Pender's model is focused on achieving optimum wellness rather than avoiding disease, which the original model stressed as the primary motivator for changing behaviors. Pender points out, for example, that consideration of the patient's prior experience with attempting to change health behaviors is a key factor for the nurse when planning strategy, including educational strategy. An obese patient with comorbidities of coronary artery disease and type 2 diabetes will likely be told to lose weight to avoid serious complications. The HPM dictates that part of the nursing assessment would be to ask the patient about prior attempts at weight reduction and perceived success of these efforts. The patient response to these inquiries will assist the nurse in development of educational interventions to address patient need. Pender also emphasizes that how the patient views the benefits and barriers to behavior change as well as the patient's own perception of ability to succeed will affect the nurse's plan for education.[2]

Nursing Theory

There are many theories that can be used as a basis for formulating patient education plans. Dorothea Orem's self-care deficit theory is based on optimizing the patient's ability to assume responsibility for his or her own care and that motivation is based on the anticipation of resuming this responsibility. Self-care is defined as "*an action of persons who have developed the capabilities to take care of themselves in their environmental situations*."[12] Orem addresses the role of family and others in the patient's social support system not only as assuming the responsibility of the patient's care when the patient is unable but also as needing nursing themselves because the self-care needs of the family unit may be affected by the needs of one member. Utilization of Orem's theory can assist the nurse in determining the teaching needs of the patient/family and to use education as a method of patient/family support.[12]

CORE COMPETENCIES

Patient Education

- Identify health education opportunities and learning needs of patients, family members, and individuals within the community.
- Assess learner readiness; acknowledge differences in learning preferences among patients and families.
- Develop teaching plans that incorporate a variety of methods and techniques to ensure that patient education is appropriate and understandable.
- Demonstrate effective communication skills by incorporating empathy, compassion, and respecting beliefs and values of the patient and family.
- Evaluate patient/family learning outcomes and determine whether additional education or changes in the approach are needed.

CONTEXT TO NURSING AND HEALTH CARE

Education of patients is integral to professional nursing practice; this fact is illustrated in multiple documents, including the American Nurses Association's *Nursing: Scope and Standards of Practice,*[13] each state's Nurse Practice Act, the Institute of Medicine's *Future of Nursing 2020-2030,*[14] and the *Quality and Safety Education in Nursing* competencies.[15] Nursing practice has been defined as "the protection, promotion, and optimization of health and human functioning; prevention of illness and injury, facilitation of healing, and alleviation of suffering through compassionate presence. Nursing is the diagnosis and treatment of human response, and advocacy in the care of patients, families, groups, communities, and populations in recognition of the connection of all humanity."[13] These positive patient outcomes are often achieved through education.

Numerous agencies require that patients and families be provided with information required to make decisions about health care and treatment of illness.[2] Modifications in health care in terms of delivery style and finance expectations have also changed the role of the patient in participating in his or her own care. This new level of patient engagement in health care requires that patient education be a priority for the registered nurse in the provision of patient care.

Consumerism has also made more individuals want to take control of their own health and wellness and is promoting more individuals to seek health education opportunities in many venues. Patient education, however, is a cornerstone of nursing

practice and is one of the ways in which members of care teams collaborate to achieve quality patient care outcomes. Quality patient education requires appropriate assessment, planning, implementation, and evaluation of this often-complex process.

The educational process and the nursing process are essentially the same[4] and include learner assessment, planning, implementation, evaluation, and documentation. Each of these steps is discussed in detail.

Learner Assessment

Learner assessment begins with a comprehensive assessment of the patient's learning needs. This may include a formalized written assessment, may be incorporated as part of the health assessment interview, or certainly may be a stated need from the patient. The assessment should include patient resources (education level, literacy level, social support, and financial resources), educational resources, and nursing resources. Assessment data should be used to develop a teaching plan that is appropriate for the patient but also one that will meet the desired goal. To fully individualize the educational plan for a patient, the nurse will consider the age, stage of development, and motivation to change behavior.

Psychosocial Development

Educational interventions must attend to the patient's achievement of developmental tasks. Erikson's theory of development is based on an eight-stage process in which each stage requires the achievement of a particular task. Completion of each stage forms the foundation of the next stage.[16] An understanding of Erikson's theory of development assists the nurse in patient education by understanding approaches necessary to accomplish the goal. For example, the educational approach taken by the nurse in teaching a patient how to use a metered dose inhaler for delivery of steroids will be different for a school-aged child than for a middle-aged adult. Using play-type activities to teach the procedure and identifying a celebrity or other role model who may need a similar treatment will appeal to the school-age patient. The middle-aged adult is more concerned with fitting this treatment into his or her normal life patterns. Finally, it is critical for the nurse to incorporate the patient's own culture to make the teaching process meaningful.

Pedagogy Versus Andragogy

An appropriate next step to follow when utilizing Erikson's theory of development is to ensure that the type of educational method used is appropriate to the individual stage of development. Pedagogy is the methodology used to assist children to learn, or the strategies of traditional teaching. Andragogy conversely describes adult learning.[17] This implies that the strategies used with great success for teaching children in classrooms may not translate to successful outcomes for the nurse teaching adults. The nurse should attend to the developmental level of the individual and tailor learning activities to account for these differences. In general, adult learning in the adult is focused on an immediate need to address a personal issue or to solve a problem. The nurse is viewed as one who can facilitate that goal rather than simply impart knowledge. All learning activities should be directed toward meeting the learning goals of the adult patient. It is also important to note that most adults enter any learning situation with a rich history of experiences that can be, and should be, drawn on by the nurse to enhance present learning.[5] The individual learner may have a social support system that should be considered/involved in the learning process.[5] Adults tend to learn best when there is a perceived need to learn the information (internal motivation) and the information perceived is pertinent to address an immediate problem or need, when learning is self-directed using learner-centered strategies with application, and when learning draws on the past experiences of the learner. The nurse further enhances learning in the role of a facilitator and by providing timely feedback.

Hierarchy of Needs

Maslow's hierarchy of needs theory is based on a simple premise that for higher level needs to be addressed, lower level needs must be met. Maslow, a humanist, concluded that if environmental conditions are appropriate to meet basic needs, then individuals will be able to learn and self-actualize.[18] This is an important concept in all types of teaching and is clear in all levels of education. A school-age child has limited ability to concentrate if the child is hungry. A college student has limited ability to concentrate and learn after an all-night study session. Of course, this extends to patients as well. For example, inadequate oxygenation, safety deficits, and food, water, and elimination needs must be addressed before the patient can adequately learn. A patient who needs to learn a complex skill must have the needs of pain management and comfort met before he or she attempts to meet learning needs. The motivation for patient education may also be linked to survival, representing a much more basic level of need. For example, a patient learning to self-administer insulin for the first time may feel a great sense of accomplishment at mastering this complex task, but the ability to self-administer this drug is truly a matter of survival for the diabetic patient.

Generational Differences

Generational differences are also a consideration when approaching patient education. Much has been reported about differences in the learning styles between generations, relating not only to the age of the patient but also to the era in which the individual was raised, as well as the social and political experiences of a group.[19] Educational approaches may need to differ for those born before 1946; members of this age group usually are self-motivated and do not seek feedback for their performance. On the other hand, members of Generation Z are dependent on technology and desire immediate feedback.[19] This generational factor, perhaps more than any other, will dictate how the nurse approaches patient education.

Literacy Level

The ability to read and understand the written word is, of course, critical if the educational process is to include any written material. According to the 2019 National Center for Education statistics, 43 million adults have low levels of literacy, limiting their ability interpret and use information.

Furthermore, the 2003 National Assessment of Adult Literacy reported that 43% of adults in the United States had literacy skills at the basic or below basic level.[20] It is also important to consider the patient's ability to understand and interpret health-related information and instructions—the individual's level of health literacy.[4] Although assessment of literacy levels can be very difficult in adult patients because of the stigma and shame often associated with limited reading ability, patients may give cues to limited literacy, such as avoiding reading materials provided (the patient may state "I forgot my glasses") or demonstrating repeated inability to follow written instructions. If there is a suspicion that the patient may not be able to read written material or that the information is written at a level that the patient cannot understand, the nurse must use alternate methods of instruction to ensure patient understanding. Although beyond the scope of this text, several methods exist for the nurse to quickly evaluate written material for readability for those with limited reading skills.

Barriers

There are a number of barriers to learning that must be considered as part of learner assessment. The lack of available social support systems, which may impair the patient's motivation to learn or ability to participate in classes or programs, is one common barrier. Lack of support may also limit the patient's ability to practice new skills. Additional patient-related barriers include cultural differences, lack of financial resources or time, and frequent interruptions. It may be within the patient's or the nurse's ability to control or remove these barriers to enhance patient learning and outcomes.

Barriers on the part of the nurse to participate in patient education include lack of time and multiple competing demands. The teaching role of the professional nurse is often not prioritized because of issues with staffing, payment, and perception of effectiveness of educational efforts. Furthermore, the nurse's professional motivation and confidence in education skills may pose a barrier to patient education. Again, assessing the nurse's attitudes can assist in identification of these professional barriers and development of interventions to overcome them.[21]

Planning

Planning is the determination of what methods will be used to meet the educational need. This includes deciding if the outcome is a cognitive (knowledge) change, a psychomotor (performance of a skill) change, or an affective (feeling or attitude) change. Determining the type of outcome dictates the approach as well as the goal. For example, a patient diagnosed with type 1 diabetes may need to learn about the overall pathophysiology of the disease so that he or she can appreciate the physical and lifestyle impact. However, the patient also needs to develop practical psychomotor skills (e.g., injection and testing) to cope with this disease. The nurse must plan not only to describe what diabetes is but also to demonstrate blood glucose testing and self-injection of insulin, allowing for practice and redemonstration from the patient and perhaps significant others as well. The teaching methodology used should match the domain of learning.

Implementation of Educational Plan

Implementation or carrying out the plan is an area in which flexibility is key. The nurse will need to determine the length of educational sessions, content to be covered, and methodology for teaching. These plans may be influenced by numerous unpredictable factors, such as patient condition and competing priorities. The nurse must adjust the teaching session to accommodate the priorities of the patient.

Evaluation

Evaluation of learning outcomes should be consistent with the domain of learning as well. Psychomotor skills, for example, require that the patient be able to *do* something, such as perform a skill. Using a survey or other measurement tool to evaluate a skill will not adequately measure this outcome. Surveys and questionnaires can be used to measure affective behavior change as well as patient satisfaction with the teaching experience. Because the goal of patient education is behavior change, the evaluation of the process may need to be conducted over time and be dependent on multiple sources of data.

Returning to the example of teaching a patient diagnosed with type 1 diabetes, the nurse will likely include cognitive information about disease pathology to appropriately manage the condition. This patient will probably need to master the psychomotor skill of blood glucose monitoring and insulin injection. The nurse will also be concerned with the affective dimension of the diagnosis of chronic disease. Evaluation of all dimensions will require that the nurse observe the skills for level of mastery, discuss the "why" of diet and exercise with the patient on multiple occasions, evaluate the effect of the patient's daily decisions on disease management, and use repeated assessment of the patient's acceptance of the condition to fully evaluate behavior change.

No discussion of patient education would be complete without consideration of patient adherence. There are many factors that block patient adherence, such as lack of understanding, literacy, financial problems, lack of environmental or interpersonal support, previous experiences with treatment or self-management, and motivation.[5] These issues should be included in the assessment process and addressed in the educational plan for the patient in an attempt to enhance compliance.

Documentation

To ensure consistency in care, documentation of patient education is included in the patient record. This documentation should be comprehensive and include not only a description of the information that the patient was taught but also an assessment of the patient's motivation, ability to learn (any physical or cognitive issues that may inhibit the process), developmental level, and resources (personal and financial, if appropriate). A detailed plan should be included in the documentation so that other professionals can reinforce the process if education is to be continued across care settings. This should include goals and progress toward them. Finally, the patient response to the educational plan and adjustments to accommodate changes in patient condition or other factors should be included to ensure consistent, successful patient education outcomes.

INTERRELATED CONCEPTS

Patient Education as a concept is central to the role of the nurse in the delivery of quality patient care (Fig. 52.3). Integral to the concept of Patient Education is **Person-Centered Care.** This concept recognizes the need for the nurse to know the individual with respect to diversity, unique aspects of that individual, and in the context of family and community. The allows for the patient to participate in their care and learning needs.[22] The professional roles and attributes of **Collaboration** and **Communication** are essential in the development, planning, and delivery of patient education, whereas the nurse's role as an educator is central to his or her **Professional Identity**. The nurse works not only with the patient but also with teams of providers in determining care needs, and quality patient education is one of the results of this skilled collaborative effort. To accomplish this, the nurse's knowledge of **Technology and Informatics** along with the ability to teach patients and families the use of healthcare technology are critical when transitioning care from the acute care facility into the home. The result of current changes in health care requires the nurse to engage in **Leadership** skills not only to assist patients and families but also to prepare the consumer for this evolution of health care.

The role of the nurse in **Health Promotion**, an area in which nurses generally take the lead, is also a critical professional dimension that is related to patient education. The nurse's knowledge and skill in recognizing opportunities to improve wellness, health, and function through lifestyle modification are used in all patient encounters and are a critical professional role in the education of patients.

Patient education incorporates the patient's attributes and resources. The nurse approaches each patient encounter as an opportunity to educate. This involves a determination of the patient's developmental level (**Development**) as well as an analysis of the dynamics of relationships (**Family Dynamics**) to assist in determination of supports and stressors. The patient's cultural background (**Culture**) and prior experiences with **Self-Management** related to prescribed treatment regimens are also concepts that have a direct relationship to patient education and, in fact, form the foundation of the assessment and planning process.

CLINICAL EXEMPLARS

Examples of patient education exist in many formats for a broad range of topics, intended for use in a variety of ways. Box 52.1 represents some of the most common examples. Grouped by the primary focus as well as how the teaching/learning may be accomplished, Box 52.1 also highlights the numerous types, venues, and media types that can be considered in patient education.

Featured Exemplars

Although a discussion of all the exemplars presented in Box 52.1 is beyond the scope of this concept presentation, brief descriptions of a few of the most common and important exemplars are presented next. Refer to other resources for detailed information about these and any of the other exemplars.

Diabetes Education

Diabetes patient education is aimed at increasing the patient's ability to self-manage this chronic condition. Diabetes education programs can take many forms, including group classes and one-to-one teaching. Typical topics included in diabetes education programs are the physiologic alterations present in this disease, diet and medication management, monitoring of blood glucose, and risk reduction. Also critical to address in a comprehensive

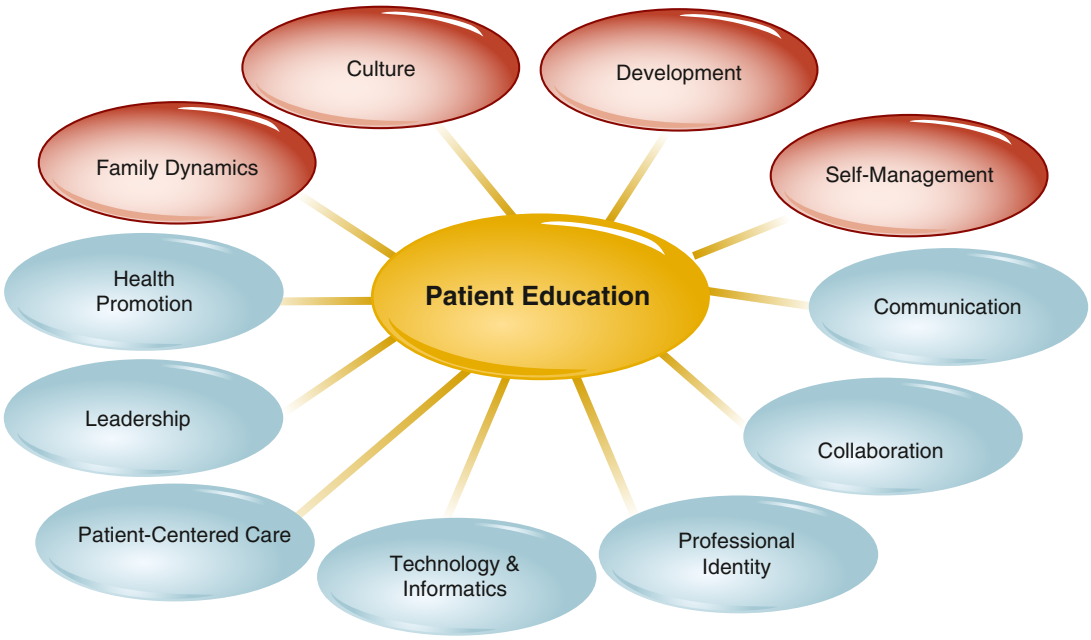

FIG. 52.3 Patient Education and Interrelated Concepts. Professional nursing concepts are represented in blue; healthcare recipient concepts are represented in red.

BOX 52.1 EXEMPLARS OF PATIENT EDUCATION

Illness-Related

Formal Patient Education Programming

- Cancer support groups
- Cardiac education
- Coumadin classes
- Diabetes education
- Group preoperative teaching
- Ostomy support group

Informal Patient–Nurse Encounters

- Discharge teaching
- Disease-specific diet teaching
- High-tech home care teaching
- Medication teaching
- Symptom control
- Targeted written materials
- Wound care

Self-Directed Patient Education Activities

- Common literature (e.g., magazines, journals, newspapers)
- Instructional videos specific to condition or treatment
- Internet resources (e.g., American Cancer Society, American Heart Association)
- Self-help books (e.g., diet plans, herbal remedies, alternative and complementary treatment, coping with addiction)

Health Promotion

Formal Patient Education Programming

- Childbirth classes
- Complementary and alternative therapy
- Drug abuse avoidance
- Elder care classes
- Parenting classes
- Risk reduction activities
- Smoking cessation programs
- Strength/endurance building
- Weight reduction classes
- Wellness education programs

Informal Patient–Nurse Encounters

- Advanced care planning
- Age-specific screening needs
- Breast-feeding
- Counseling
- Genetic screening
- Health counseling
- Immunization teaching
- Preventing sexually transmitted diseases

Self-Directed Patient Education Activities

- Common literature (e.g., magazines, journals, newspapers)
- Exercise videos (e.g., aerobics, yoga, Pilates)
- Instructional videos specific to health-related topic
- Internet resources (e.g., WebMD, Real Age)
- Self-help books (e.g., diet plans, herbal remedies, alternative and complementary treatment, coping with addiction)
- Television (e.g., health-related programming, FIT TV)

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education plan is the psychosocial impact of this condition. If patients are unable to self-manage, family members and other support people can be educated to assist in the care.[23]

Cardiac Education

Another common chronic condition warranting special attention is cardiac education. This represents a broad scope if information including medication management, a variety of treatment options, and risk reduction. The following are important topics to include in prevention programs as well as postdiagnosis education programs: alterations in lifestyle such as diet modification, weight loss, and control of diabetes; interpretation of common laboratory values (lipid profile); and sleep patterns and stress reduction. Concerns related to return to work, sexual activity, and exercise should be included in a comprehensive education plan. This information can be covered in group classes, which offer the benefit of support of others, or one-to-one teaching.[23]

Genetic Screening (Testing) Education

Genetic screening represents an exemplar of patient education associated with health promotion and risk reduction. Although nurses are an excellent source of general information regarding genetic testing and screening, it is important to advise patients to consult with a genetics counselor if they are considering genetic testing. This professional can provide the most accurate information about cost, confidentiality of results, and the risks and benefits of testing. General information that can be provided to patients involves the information that can be gleaned from genetic testing as it relates to risk of developing a particular disease and passing that risk on to offspring.[23]

Complementary and Alternative Therapy

Inquiry into the use of complementary and alternative therapies should be part of a complete health assessment. This information is incorporated into a teaching plan for the patient. Teaching should include information about the specific type of complementary or alternative therapy (e.g., herbal supplements and meditation, acupuncture, or chiropractic intervention) and how these therapies may relate to more conventional treatments. For example, patients using herbal remedies should be instructed about the storage and use of these remedies and any potential medication or food interactions and also about potential complications of use in the perioperative period.[23]

Smoking Cessation Programs

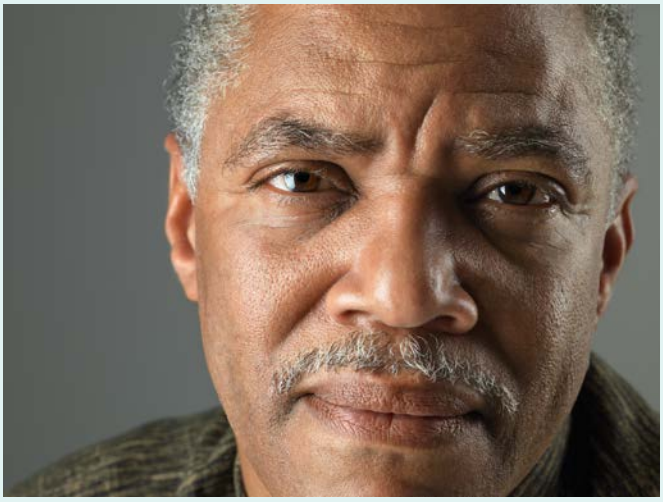
Smoking cessation programs, representing among the most common areas of health promotion education, are designed to assist smokers to stop their use of cigarettes and other forms of tobacco.

These programs provide education on the dangers and risks of tobacco use, but they are more focused on methods of stopping habitual use. Interventions may vary depending on the type or sponsor of the smoking cessation program, but they may include nicotine replacement, behavior modification, counseling, support, and relapse prevention. Education plans may also include nonnicotine drugs that may assist the patient to quit, such as some antidepressant medications.[24]

Internet Resources

Many patients actively research symptoms, diagnoses, and treatment options through use of the Internet. Although the Internet is often an excellent resource, the nurse remains an active partner in the education of the patient and family by answering questions, reviewing material and websites for accuracy, and assisting the patient and family to locate high-quality health information. It is also important to note that use of Internet resources requires access to a computer or mobile device and some comfort with technology.[25]

CASE STUDY



Source: Fuse/Thinkstock.

Case Presentation

Mr. Jacobs is a 55-year-old college-educated male recently diagnosed with colon cancer. He is scheduled for a colectomy with formation of a colostomy. Prior to meeting the patient, the nurse reviews the health record and notes that Mr. Jacobs is able to read English, has family support, and is currently not working. Mr. Jacobs' wife works in retail.

Mr. Jacobs is very health conscious, and his goals are to return to "normal" life. The nurse notes a comment made by Mr. Jacobs that "a colostomy is the one thing I said I would never live with." The nurse determines that these comments made by Mr. Jacobs require follow-up and asks for more information about what Mr. Jacobs means by returning to a "normal" life. Mr. Jacobs and the nurse discuss that although his routines may need to be altered, he may find that he will be able to return to previous activities. Mr. Jacobs is hesitant to discuss sexual activity with the nurse but reluctantly admits he is concerned about intimacy. Written information on sexual activity for those with colostomy and referral to a local support group will be included as part of the plan for Mr. Jacobs.

The nurse develops a teaching plan for Mr. Jacobs that includes the provision of written material about colon cancer, anatomy and physiology of the gastrointestinal tract, and alterations presented by having a stoma. Options for care of the stoma are also provided in writing. A second visit to demonstrate how the ostomy appliance is fitted, emptied, and changed is planned. A manikin abdomen will be used to demonstrate and practice stoma care with the patient. Mr. Jacobs is in the developmental stage of *generativity versus stagnation*.[17]

When planning for his learning needs, the nurse uses multiple sources of information to teach Mr. Jacobs according to his level of education but also attends to the fact that psychomotor learning is required. To evaluate the outcome of the educational intervention conducted, the nurse follows up with Mr. Jacobs to determine his competency (both actual and perceived) in performing the necessary skills of care and Mr. Jacobs' emotional and attitudinal changes related to the ostomy and his illness. Plans are changed and adjusted according to Mr. Jacobs' progress toward his goals, incorporating family members while Mr. Jacobs becomes ready for this step.

Case Analysis Questions

1. Consider the attributes and criteria of this concept. How are these reflected in this case?
2. What learning domain needs are evident in this case?
3. What follow-up needs should the nurse anticipate in the postoperative period?

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CONCEPT 53

Palliative Care

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Palliative care is an integrated approach that focuses on the physical, psychological, emotional, social, cultural, and spiritual needs of patients and their family caregivers who are experiencing serious, life-threatening, progressive, or chronic illness.[1] The issues affecting the care of patients with serious, life-threatening, and chronic illness are expected to intensify during the next several decades, particularly given the aging population. It is predicted that by 2030, for the first time in history, people aged 65 years and older will outnumber others.[2] Unlike a century ago, when most people died of common infections, accidents, or other rapidly lethal diseases, the current leading causes of death in the United States are respiratory diseases (including COVID-19), cardiovascular disease, cancer, trauma, cerebrovascular diseases, chronic lower respiratory disease, and dementia.[3] In 1990s, hospice care moved from the home to the academic setting. This new care, offering both whole person-centered and family-focused, comprehensive care to all patients with chronic, serious illness, not just terminally ill patients, was called palliative care.

From a global perspective, it is estimated that 40 million people worldwide will need palliative care because of chronic, noninfectious diseases.[3] In the United States, palliative care has permeated across acute care in the United States. Some 72% of hospitals with over 50 beds having palliative care teams, leaving about 30% of hospitals without palliative care teams.[4] Community-based palliative care is still developing, as it is estimated that 40% of counties in the United States have access to community palliative care.[5] Because there is wide variability in financial resources and community partnerships, much work and technical assistance is needed to assure quality community-based programs.

DEFINITION

Gaining a clear understanding of this concept starts with an understanding of several terms. The term *palliate* means to moderate or ease symptoms. The term *palliative* refers to the relief of a symptom without treating the underlying health condition. *Palliative care* means *to* "cloak," "soothe," or "alleviate" the pain and suffering associated with serious, progressive, life-threatening or chronic illness.[6] More broadly, the concept of palliative care refers to a holistic approach to care that focuses on the physical, emotional, social, cultural, and spiritual needs of both the patient and their family members across the illness trajectory.[6] For the purposes of this concept presentation, the definition of palliative care offered by the Center for Medicare and Medicaid Services (CMS) is used:

> *Palliative care means* ***patient and family-centered care*** *that optimizes quality of life by anticipating, preventing, and treating suffering. Palliative care throughout the continuum of illness involves addressing physical, intellectual, emotional, social, and spiritual needs* ***and to facilitate patient autonomy, access to information, and choice.***[6]

Palliative nursing practice is evidence-based care that includes "the assessment, diagnosis, and treatment of human responses to actual or potential life-limiting illnesses within the context of a dynamic caring relationship with the patient [person] and family, in order to reduce or relieve suffering and optimize health".[7] The definition of palliative care recognizes the multidimensionality of the illness experience. Moreover, palliative care is appropriate for end-stage organ diseases such as end-stage heart, lung, liver, or kidney disease, as well as neurodegenerative diseases or life-threatening infections.[1] Like hospice, palliative care promotes quality of life in a person with a serious illness through exquisite pain and symptom management, optimization of functional status, and support for patients and families. However, unlike hospice, which is limited to a prognosis of 6 months or less, palliative care begins with the diagnosis of a serious illness and includes both curative treatments and symptomatic therapies. Palliative nursing encompasses care and early integration of individuals newly diagnosed with a serious illness along the trajectory to hospice nursing, which focuses on care for individuals at the end of life.

SCOPE

Palliative care is offered to patients and their family caregivers across the lifespan and across the illness trajectory, beginning at the diagnosis of serious disease and continuing into the bereavement period for families,[1] and can be delivered concurrently with disease-specific life-prolonging treatment. The World

Health Organization states that palliative care should be part of comprehensive health care.[8] The changing demographics of populations, changing illness trajectories, advances in health care, and longer life expectancies have created an increased need for palliative care offered across the lifespan, from neonates to the frail elderly.

As shown in Fig. 53.1, palliative care is offered from the time of diagnosis with a life-threatening illness until death and into the bereavement period for families.[1] Palliative care is focused on interprofessional care of individuals and their families. It can be accessed across health settings and the continuum of care from the office or clinic, home, long-term care, rehabilitation setting to the hospital, skilled facility, group homes as well as adult and pediatric day programs. However, palliative care services vary widely across settings, populations, and demographic regions of the United States. Delivery has many facets, as it can be delivered in-person, via technology, or a hybrid. In-person has been the traditional route, but the shortage of specialty providers has meant lack of equitable access to quality palliative care.

There are many diseases or conditions for which there may be no further treatments available or for which the burdens of treatments outweigh the benefits. Therefore, it is often still a common occurrence that the patient is told there is nothing more to do or receives limited care. In these instances, the patient is offered "comfort care," "supportive care," "end-of-life care," or hospice care, in which there is still much care to offer. However, the care of this patient should never stop. Instead, the goals of care can change from being aggressive and treatment-focused to focusing more on the patient's comfort and promoting their quality of life. Hospice care, as the gold standard of terminal care, means these patients receive expert pain and symptom management, psychosocial support for themself and the family, spiritual support, and home support to prevent admission to the hospital or long-term care setting. However, it seemed unethical that only patients who were dying received such comprehensive care.

The National Consensus Project for Quality Palliative Care explains that palliative and hospice care are part of a continuum of care, with palliative care beginning "upstream" at diagnosis.[1] Palliative physicians, nurse practitioners, and physician assistants may serve as a patient's attending of record. Palliative care outpatient clinicians often collaborate with patients who are still receiving curative treatments in which the focus of care is on promoting quality of life and assuring that treatments match the patient's overall goals of care. In addition, palliative care clinicians can continue to see patients under the care of hospice programs and home health agencies, as there may be a concurrent focus of coping with life limiting illness along and the receiving aggressive treatments to manage pain, symptoms, and distress. However, it is recognized that some people will decline hospice or home health services, but still receive palliative care in their communities.

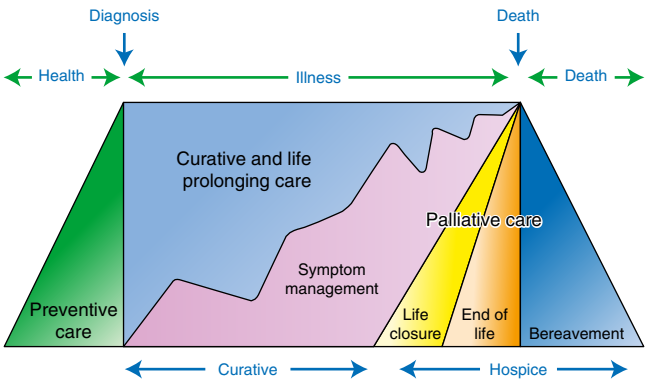

Fig. 53.1 Scope of Concept: Palliative Care Through the Healthcare Trajectory. (Created by H Farfour, T Kachaamy (2022). Adapted from the integrated model of care proposed by World Health Organization (WHO), 1990.)

ATTRIBUTES AND CRITERIA

Palliative care is a comprehensive, holistic interprofessional approach to care of patients and families across the lifespan who have serious, life-threatening, progressive, or chronic illness or conditions.[1] Palliative care is a team approach to care, and this approach is unique as the family is a part of the care delivered. Palliative care applies a patient-centered philosophy, in which the needs of the patient and their goals form the basis of the patient's care plan.[9] Patient-centeredness broadens the focus of care and requires well-defined coordination across specialties and disciplines as well as access to specialty palliative care clinicians such as nurses, physicians, social workers, and chaplains.[1]

To promote, maintain, and even restore the patient's and family's quality of life, a interprofessional model of care is essential. Optimal functioning of a team requires outstanding training, communication, and the role delineation of each team member.[10] Palliative care encompasses the following three primary attributes:

1. state of the art treatment tailored to the individual;
2. support for the family unit and/or caregivers; and
3. an interprofessional team approach.[4]

Secondary attributes of palliative care include the following:

- Promoting equitable access to quality palliative care and reducing health disparities for marginalized populations;[11,12]
- Providing comprehensive, culturally sensitive, assessment and optimal management of physical and psychological symptoms (i.e., pain, dyspnea, nausea/vomiting, constipation, anxiety, agitation, and depression);
- Eliciting and advocating for the wishes and preferences of patients and developing a comprehensive and individualized plan of care reflective of patient values, preferences, and social determinants of health;
- Assisting patients in advance care planning including the delegation of a surrogate decision-maker, clarifying values, preferences, and beliefs in advanced directives, and out of hospital orders for life-sustaining treatment with the completion of appropriate documents specific to each state;
- Promoting effective communication among patient, families, and members of the interprofessional team; and
- Promoting continuity of care and care coordination across transitions of care.[1,11]

THEORETICAL LINKS

Palliative care and nursing practice have always been synergistic. They both alleviate suffering and work to prevent actual or potential problems and promote quality of life. Several theories can be applied to palliative care, particularly human-centered theories. A widely known theory that clearly aligns with palliative care is Watson's Human Caring theory.[13] According to Watson, care involves human-to-human interactions that guide care, self-healing, and human flourishing. At the center of Watson's model is a deep respect and caring for the patient. By design, palliative care is an approach to improve the quality of life for patients and their families with an emphasis on compassion and comfort; thus, it is clear how Watson's theory is useful as a basis for palliative care.

The skills used in palliative care have always been part of nursing; however, there has not been an emphasis on educating nurses on caring for individuals with serious illness. Yet all nurses will encounter such patients no matter their specialty practice or where they practice. There are two levels of palliative nursing: primary and specialty practice. Descriptions of each level follows, and useful resources for each level are presented in Box 53.1.

Primary Palliative Nursing

All nurses should be skilled in primary palliative nursing. Registered nurses and advanced practice registered nurses develop a working knowledge of issues surrounding patients with serious illness. Nurses integrate general skills such as common pain and symptom management, common communication skills such as advance directives, quality-of-life questions, and understanding the resources of one's community of practice.[14-16]

BOX 53.1 Resources for Primary and Specialty Palliative Nursing

Primary Palliative Nursing

American Association of Colleges of Nursing. (2021). The Essentials: Core competencies for Professional Nursing Education.

American Association of Colleges of Nursing. (2016). CARES: Competencies and Recommendations for educating undergraduate nursing students – Preparing nurses to care for the seriously ill and their families. Washington, DC: AACN.

American Association of Colleges of Nursing. (2019). Graduate Competencies and Recommendations for Educating Nursing students (G-CARES). Washington, DC: AACN.

City of Hope. End of Life Nursing Education Consortium (ELNEC) – Core, APRN, Critical Care, Geriatrics, Pediatrics.

Ferrell B, Paice, J. (Eds). (2019). Oxford Textbook of Palliative Nursing, 5th edition. New York, NY: Oxford University Press.

Specialty Palliative Nursing

American Association of Colleges of Nursing. (2021). The Essentials: Core Competencies for Professional nursing Education.

Dahlin, C (2021). Palliative Nursing: Scope and Standards of Practice (6th ed.). Pittsburgh, PA: Hospice and Palliative Nurses Association.

Dahlin, C. (2021). Competencies for the Palliative and Hospice Registered Nurse (4th edition). Pittsburgh, PA: Hospice and Palliative Nurses Association.

Dahlin, C. (2021). Competencies for the Palliative and Hospice Advanced Practice Registered Nurse (3rd edition). Pittsburgh, PA: Hospice and Palliative Nurses Association.

Specialty Palliative Nursing

Registered nurses and advanced practice registered nurses with additional educational preparation, clinical practice experience in a palliative care setting, and demonstration of identified competencies practice specialty palliative nursing. Care includes culturally sensitive delivery of care, management of complex and refractory symptoms, advanced skills in communication and conflict resolution, and navigation of the changing care needs across the trajectory of life. Specialty palliative care occurs in a variety of settings (e.g., community settings, which include home and residential hospice and palliative care programs, programs in long term care, disease-specific palliative care clinics, and acute care programs).[14-16]

CORE COMPETENCIES

Palliative Care

- Advocate for and promote integration of palliative care for patients with serious illness or injury and for their families across the disease trajectory as essential to quality care.
- Communicate effectively, respectfully, and compassionately with patients, families, interprofessional team members, and the public about palliative care.
- Utilize evidence-based tools to perform a holistic health assessment of pain and other symptoms, considering physical, psychological, social, and spiritual needs.
- Support patients, families, and team members to cope with suffering, grief, loss, and bereavement.
- Demonstrate respect for person-centered care by aligning the plan of care with patient and family values, beliefs, preferences, and goals of care.
- Provide culturally sensitive care that is responsive to rapidly changing physical, social, and spiritual needs during the dying process and after death.

Data from American Association of Colleges of Nursing and City of Hope. (2022). *Primary Palliative Care Competencies for Undergraduate and Graduate Nursing Students (CARES/G-CARES).* (2nd ed.) Washington, DC: American Association of Colleges of Nursing.[17]

CONTEXT TO NURSING AND HEALTH CARE

In 2018, more than 60 million people needed palliative care, 58% of whom were older than 60 years of age and 6% of whom were children.[18] Millions of Americans are living with one or more chronic debilitating diseases, and 7 out of 10 Americans can expect to live with their diseases for several years before dying.[2] When coupled with the advancing age of some 70 million baby boomers who now qualify for Medicare, enormous demand will be placed on healthcare resources and community-based services.[19] These demands will force changes in patterns of care for patients living for several years with serious, chronic illness and the ensuing complications.

Palliative care is also an integral component of the management of health emergencies, humanitarian crises, and pandemics (i.e., COVID-19). The World Health Organization states that "humanitarian responses to emergencies should have palliative care and symptom control."[20] Palliative care is an important aspect of the response to emergencies (such as mass casualties from accidents or shootings), natural disasters (such as fires, earthquakes, floods, hurricanes, and blizzards), public health crises (such as disease outbreaks), and areas of conflict or detention.

In the U.S., this includes settlements for individuals detained due to immigration status. In these national and global situations, palliative care buttresses critical care and emergency clinicians.

Early referral to palliative services can make a difference in the treatment approach, resulting in positive healthcare outcomes even in the face of serious illness or impending death. Nurses are often the first clinicians that patients meet and, therefore, have an essential role in providing education to patients and families to facilitate their engagement in early palliative care when appropriate. It is essential that nurses have primary palliative care education to assure access to quality care across all settings.[14]

Essential skills include the assessment of an individual's physical, psychological, social, spiritual, and cultural aspects of care, effective communication, patient and family education and information to promote informed decision making, meticulous management of pain and symptoms, determination and optimization of functional status, and support of coping patterns. According to Coyle, "The [palliative] nurse's individual relationship with the patient and family is seen as a crucial [component of the care provided]. This relationship, together with knowledge and skills [to promote quality of life], is the essence of palliative care nursing and sets it apart from other areas of nursing practice." [21]

Many children live with chronic disease, including rare diseases as well as neurologic, genetic, or metabolic conditions and terminal illness. Palliative care provides the active total care of the child's body, mind, and spirit and gives support to the family unit.[22] Pediatric palliative care encompasses the care of perinates, infants, children, and adolescents and includes symptom management, prognosis sharing, serious illness communication and documentation, and support for psychosocial and spiritual suffering. Like adults, pediatric palliative care can be provided in tertiary centers, rehabilitation settings, pediatric health day centers, clinics, or at home. The implementation of care is unique due to the varying cognitive abilities and emotional maturity of the child or adolescent, differences in emotional and psychological issues, and decision-making authority lying in a parent or guardian. Because of the lack of pediatric palliative care providers in the community, nurses who specialize in adult care may be enlisted to provide care to children.

Palliative Care as a Team-Based Approach

A fundamental practice focus for palliative nursing is the development and management of clinical plans, not only for individuals with serious illness and their families, but also for interprofessional colleagues. The plan is established collaboratively between the individual, their family (who form the unit of care and are the drivers of care), and the nurse, in conjunction with the physician and other team members, which may include but are not limited to social work, chaplaincy, pharmacy, physical therapy, occupational therapy, and speech and language pathology. The plan of care is implemented through effective communication and attention to the linguistic, health, and educational literacy of the patient and the family unit.[23-24]

To meet the multidimensional needs, the comprehensive needs of patients and families are addressed by an interprofessional palliative care team characterized by a collaborative process that includes information exchange and coordinated care planning to achieve patient- and family-centered care. Services commonly offered by the palliative care team are presented in Box 53.2.

The central focus of the team is to engage and partner with patients and families to provide effective and efficient care coordination.[25-26] The interprofessional team must have an appropriate number of dedicated and palliative care specialty educated staff available.[1] Education must include cultural awareness and competence to deliver culturally sensitive care.[11]

Core Services

The palliative care team often represents a variety of disciplines and services; the five core services include chaplaincy, social work, nursing, medicine, and pharmacy, as per the NCP *Clinical Practice Guidelines*.

Expanded Services

With each patient, there may be a larger circle of care professionals. The team expands and contracts depending on the situation. All members of the interprofessional team contribute their expertise and knowledge in assisting patients and family members to establish goals of care and identify treatment wishes and preferences that facilitate patient/family choice and autonomy.[1] This includes:

- *Psychological support*—psychologists or psychiatrists who provide support to enable coping for the patient and family
- *Care coordination and case management*—manage care across transitions
- *Expressive therapies*—child life, art, and music therapists
- *Volunteers*—bereavement counselors, family support specialists, and volunteers
- *Integrative therapies*—Reiki, massage, acupuncture, and pet therapists

BOX 53.2 Common Palliative Care Services

- Individualized patient-centered care with regards to culture, religion, and social determinants of health
- Cultural assessment including religion and spirituality and the specific influences on care and the needs of patients and family in the context of culture, ethnicity, and religion
- Physical assessment and management of symptoms with focus on proactive planning (pharmacologic, nonpharmacological, interventions, integrative therapies)
- Psychological assessment and management of symptoms with focus on proactive planning (pharmacologic, nonpharmacological, interventions, integrative therapies)
- Spiritual assessment and management of distress with focus on meaning of life
- Emotional support and counseling (patient and/or family) in the context of culture, ethnicity, religion, and family systems
- Medication management (monitoring, reconciliation, safe storage, safe prescribing or deprescribing, safe disposal)
- Risk Assessment Tools (Opioid Risk Tool and Substance Misuse Disorder Evaluation)
- Care coordination, oversight of transitions of care
- Community partnerships and accessing social services (community and health system)
- Planning for end of life with timely referral to hospice, as appropriate to patient preferences
- Grief and bereavement support for family

Strategic Directions for Palliative Care

In 2017, the American Nurses Association and the Hospice and Palliative Care Nurses Association released *A Call for Action: Nurses Leading and Transforming Palliative Care.* The document emphasizes an interprofessional model of clinical practice in which palliative care practitioners collaborate to provide evidence-based care to create a plan of care that reflects patients' wishes and preferences.[14] In addition, it describes the current state of palliative care and the mandate for all nurses to have primary palliative care skills. It recognizes that nurses at all levels must receive palliative care education in their preparation education to deliver primary palliative care and that some may choose to practice specialty palliative care.[14]

One recommendation of the American Nurses Association and the Hospice and Palliative Nurses Association is that all nurses pursue End-of-Life Nursing Education Consortium (ELNEC) training, which is available for critical care nurses, geriatric nurses, pediatric nurses, general nursing practice, and advanced practice nursing.[14] In April 2021, an exciting development occurred with the release of the American Association of Colleges of Nursing *Essentials: Core Competencies for Professional Nursing Education.*[16] One of the core four spheres of nursing care is now hospice/palliative/supportive care across the life cycle. AACN states this includes end-of-life care as well as palliative and supportive care for individuals requiring extended care; individuals with complex, chronic disease states; or individuals requiring rehabilitative care.[16] This bodes well for all nurses to have primary palliative nursing education and training to care for individuals with serious illness.

Changing Models of Care

To mitigate the limited access to palliative care in rural areas, many palliative care programs have developed telehealth models of care.[27-28] The use of telepalliative care has increased exponentially throughout the COVID-19 pandemic.[29-30] It can be delivered by multiple members of the interprofessional team in both the inpatient and outpatient setting.[28-29] Telepalliative care provides patients with increased access to a team that can help with pain and symptom management, medication management, advance care planning, goals-of-care discussions, counseling, discharge planning, and planning for end of life.[28-29]

Studies of telepalliative care have been largely positive.[28] The most frequently cited benefit is increased early access to palliative care, which leads to better overall patient care.[30] Other benefits include reduced wait times, earlier interventions, reduced travel, reduction in hospitalizations, and an increase in hospice enrollment.[27,30] An underlying theme is that telepalliative care decreases health disparities through access affected by ability to travel and lack of services. There have also been findings that indicate patients can have an increased ease of discussing sensitive information to clinicians when doing so through a telehealth medium.[27,29,30]

Telepalliative care presents several challenges. These include the lack of physical exam capability, technology issues, needing different institutional access to electronic health records, and visual/physical fatigue from clinicians with multiple video visit sessions in one setting.[29] In managing these issues, there is more exploration into using supplemental data such as mobile phone or other devices that provide information on vital signs and collaboration with visiting home health or hospice nurses who can provide data. In addition, better processes are being evaluated for more effective video visits. An ongoing issue is that it could add to the "digital divide" adding healthcare disparities to those who do not have available devices and connectivity for telehealth visits.[27] Despite these challenges, the overall findings have been positive. It is believed that telepalliative care will continue to be increasingly utilized even after the pandemic.[29] Table 53.1 compares benefits and challenges with telepalliative care.

INTERRELATED CONCEPTS

The National Consensus Project for Quality Palliative care delineates eight domains that are crucial for the delivery of quality palliative care; these are shown in Box 53.3. The interrelated concepts associated with Palliative Care are organized around these domains. Domains are shown as boxes; the concepts presented within this book (shown as ovals) are linked to these eight domains (Fig. 53.2).

Benefits	Challenges
Patient	*Patient*
Results in patient's increased ease of sensitive discussions	Necessitates scheduling
Results in higher patient satisfaction	Necessitates learning technology and flow for the visit
Appears to be generally well-accepted	Hinders privacy of visit depending on setting
Reduces or avoids travel to health settings	Reduces sense of human connection
Reduces caregiver burden with quicker response	Potential for digital divide for those without technology
Palliative Care Provision	*Palliative Care Provision*
Allows for earlier interventions	Hinders physical examination
Assists in rapid symptom control	Hinders reading non-verbal communication
Allows for view of actual home setting	Incurs start up financial and education consideration
	Necessitates new scheduling paradiams

BOX 53.3 The Eight Domains of Palliative Care

1. **Structure and processes of care**
Program structure, palliative process, education and training of team members, comprehensive care delivery
2. **Physical aspects of care**
Assessing and managing pain, dyspnea, constipation, etc., through established and validated tools
3. **Psychological and psychiatric aspects of care**
Assessing and managing anxiety, depression, and other common psychological symptoms or normal psychological reactions of patients/families to serious illness, through established, validated tools and including the establishment of organized grief and bereavement tools
4. **Social aspects of care**
Assessing patient and family with a family assessment, to ensure social determinants of care support the care needs of the patient and family
5. **Spiritual, religious, and existential aspects of care**
Understanding and assessing the multidimensionality of spirituality and religion and the needs of patients and families, religious practices or rituals, appropriate assessment, and the provision of spiritual and existential support
6. **Cultural aspects of care**
Understanding and assessing the multidimensionality of culture, appropriate assessment, to assure decision making and preferences of patient or family regarding the disclosure of information and truth-telling, language, and rituals
7. **Care of the Patient Nearing the End of Life**
Recognizing advanced illness to ensure communication and respect in planning use of time consistent with the patient's wishes. Proactive planning for end of life in terms of site, social, cultural, and spiritual detail. Ensuring attention to social, cultural, spiritual, physical, and psychological needs at the end of life; and providing bereavement support to caregivers
8. **Ethical and legal aspects of care**
Determining and documenting patient/surrogate preferences for goals of care, treatment options, and setting of care; promoting advanced care planning; and signing of appropriate documents. Understanding the ethical and legal aspects of palliative and organizational resources

Data from National Consensus Project for Quality Palliative Care. (2018). *Clinical practice guidelines for quality palliative care* (4th ed.). Richmond, VA: National Coalition of Hospice and Palliative Care.

Domain One (Structure and Processes of Care) focuses on interprofessional team engagement and collaboration with patients and family members. Concepts such as **Person-Centered Care, Health Care Quality**, and **Care Coordination** are included in this domain.

Domain Two (Physical Aspects of Care) and Domain Three (Psychological and Psychiatric Aspects of Care) focus on the physical, psychological, and psychiatric assessments and treatment of the whole person. These domains integrate a variety of concepts, such as **Fatigue, Sleep, Nutrition, Elimination, Pain, Mood and Affect, Anxiety**, and **Stress and Coping**. These concepts present common symptoms and difficulties for patients in palliative care and require the best thinking of palliative care practitioners. The use of evidence supports high-quality interventions in palliative care, resulting in improved quality of life.

Domain Four (Social Aspects of Care) focuses on the family as the unit of care and developmental needs. Nurses identify, support, and capitalize on family strengths in collaboration with social work. Palliative nurses must elicit age, name and pronoun preferences, gender identification, gender expression, ethnicity, the various dimensions of literacy—health, financial, and cognitive—and abilities—vision, hearing, speech, mobility, and cognition. Interrelated concepts include **Patient Education, Family Dynamics**, and **Development**.

Domains Five (Spiritual Aspects of Care), Six (Cultural Aspects of Care), and Seven (Care at the End of Life) encompass concepts mentioned and also on the far-reaching aspects of **Culture**. It includes diversity to reference the board range of individual, population, and social characteristics, including but not limited to age, sex, race, ethnicity, gender identity, gender expression, religious beliefs, socioeconomic status, geographic location, family structure, national origin, immigrant and/or refugee status, primary and preferred language, and any impairment that substantially limits a major life activity.

Domain Eight (Ethical and Legal Aspects of Care) focuses on goals and preferences of patients in terms of their care and the role of the nurse to promote communication on these difficult topics. In addition, there is discussion of the complex ethics that accompany palliative care such advocacy for access to quality palliative care for all individuals with serious illness and withholding or discontinuing life-sustaining treatments. Ethical issues also include morality including moral injury, moral distress, and moral residue. Finally, there is the acknowledgment of providing care within the legal aspects of palliative care that vary by geography—city or town, county, state, and country. Concepts include **Ethics, Evidence, Health Policy, Health Care Law**, and **Health Disparities and Equity**.

CLINICAL EXEMPLARS

Since palliative care is practiced in the acute setting, clinic setting, home setting, and long-term settings, examples of palliative care delivery in locations with diverse conditions are offered. Box 53.4 identifies some of the most common diagnoses associated with palliative care based on CDC causes of death, which are previously listed. Because most healthcare professionals and the public associate cancer with palliative care, there is a deliberate focus on noncancer conditions.

Featured Exemplars

Stroke

Stroke, otherwise known as a cerebral vascular accident (CVA), results in ischemia to the brain. Patients may experience varying degrees of paralysis or weakness and, depending on the affected area of the brain, may also experience subsequent physical, emotional, behavioral, and motor sensory effects. CVAs often occur in conjunction with other comorbidities and without warning necessitating critical care. Moreover, patients and their families are faced with life-altering and catastrophic changes.

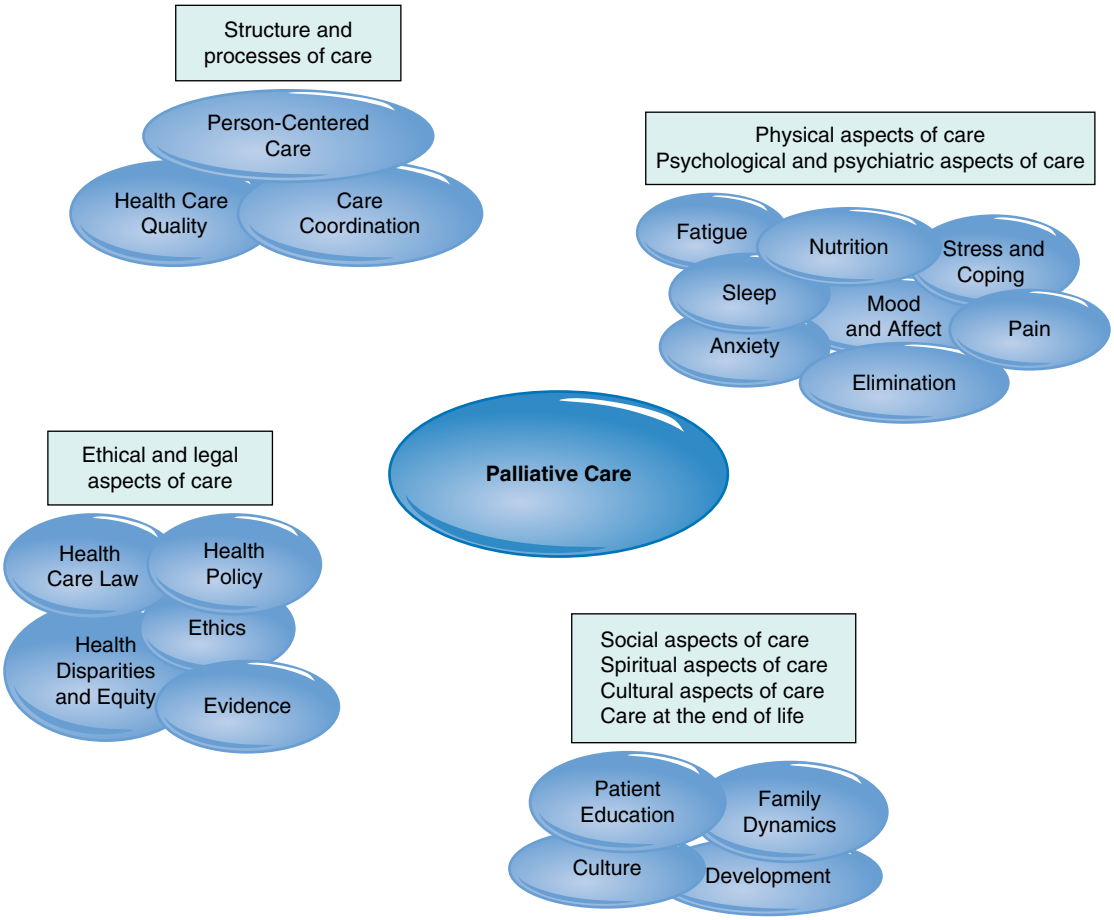

Fig. 53.2 Palliative Care and Interrelated Concepts.

In these situations, palliative care provides holistic care of the patient and family to help them cope with the residual effects of the CVA. In addition, it focuses on discussions of goals of care and expectations while determining the plan of care.[31]

Heart Failure

Heart disease is one of the leading causes of death, yet just a small percentage of patients enter hospice. Physical symptoms include shortness of breath, chest pain, fatigue, depression, and edema. Most symptoms can be managed by cardiac protocols. Moreover, acute events often result in various procedures such as automatic implantable cardioverter-defibrillator (AICD), pacemaker, and ventricular assist device. Often there had been no discussion of their long-term benefits and burdens. Palliative care can promote advance care planning and discussions on goals of care to help with promoting quality of life.[32]

Pulmonary Disease

Pulmonary disease includes obstructive and restrictive diseases which result in lung damage, making it difficult to efficiently breathe. Physical symptoms associated with pulmonary disease include shortness of breath, low oxygen in the blood, cough, pain, weight loss, and infections. Patients may also experience psychological symptoms of depression, anxiety, insomnia, and social isolation. Palliative care aims to improve quality of life through pharmacologic and nonpharmacologic management. Interprofessional team members are essential to help with energy conservation, dietary modifications, counseling, and emotional/spiritual distress.[33]

Dementia

There are many types of dementia—Alzheimer's, Lewy body, and vascular are very common. Dementia is primarily diagnosed in older adults who experience progressive cognitive impairment, memory loss, and decreased level of functioning. Advance care planning becomes paramount with ongoing discussions of goals of care. Understanding the patient's view of quality of life and preferred treatments is essential to assisting with decision making about transfers to the hospital, and treatments such tracheostomy placement, medically administered nutrition, antibiotics, and ventilatory support. Patients and families can benefit from palliative care symptom management, family support, and proactive management of future care needs. In addition, since the trajectory of dementia is attenuated, families need assistance to secure resources and respite.[34]

BOX 53.4 EXEMPLARS OF COMMON PALLIATIVE CARE CONDITIONS

Perinatal and Neonatal

- Congenital anomalies
- Stillbirth

Children, Adolescents

- Cerebral palsy
- Congenital malformations
- Chromosomal abnormalities
- Childhood cancers
- Cystic fibrosis
- Muscular dystrophies
- Trauma (head injuries, accidents)
- Sickle cell disease

Adults

- Neurologic (Parkinson's disease, amyotrophic lateral sclerosis [ALS], muscular dystrophy [MD], Huntington's disease, supranuclear palsy, multiple sclerosis)
- Trauma (major bone fractures, organ and brain bleeds, traumatic brain injury)
- Infectious diseases
- Cancer
- Cardiovascular disease—Advanced heart failure (HF), stroke
- Degenerative disorders— (Dementias, i.e., Alzheimer's disease, Lewy body dementia, vascular dementia)
- Human immunodeficiency virus (HIV)/acquired immunodeficiency disease syndrome (AIDS)
- Kidney conditions—Chronic and End-stage kidney disease (CKD, ESKD)
- Liver conditions—End-stage Liver Disease (ESLD), Hepatitis B and C
- Respiratory Conditions - Pulmonary Arterial Hypertension (PAH) — Chronic obstructive pulmonary disease (COPD), COVID-19

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

COVID-19

The COVID-19 pandemic has affected all aspects of health care on an unprecedented scale. Palliative care has not been immune to the many challenges it has presented.[35] The unexpected, sudden, and often serious nature of a COVID-19 infection led to many patients being admitted to the hospital with unknown expectations; thus, palliative care has been a vital service to help with the overwhelming influx of seriously ill patients.[35] The absence of family at the bedside increased stressors and made it harder to conduct serious illness conversations; however, palliative teams utilized their expertise in goals of care conversations, managing symptoms, providing psychosocial support, and conducting serious illness conversations.[35-36]

In the outpatient setting, patients had increased symptomatic needs, psychosocial needs, and increased caregiver strains.[37] Fortunately, telepalliative care allowed increased access to needed palliative care services across many settings and reduced the risk of spreading the virus.

Trauma

Trauma includes vehicular accidents, drownings, acute events such as aneurysms or arrythmias and the like. Palliative care offers the ability to meet unmet needs of this population and their families. There is an opportunity for nursing to look at barriers and increased utilization of this population of patients. The role of palliative care assisting within trauma care may be effective in decreasing post-traumatic stress disorder (PTSD), improving communication in patients with complicated and serious illnesses who may also have comorbidities.[38] Of late, there has been interest in increasing palliative care utilization from trauma services.[39]

CASE STUDY

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Case Presentation

Carlotta Jones is a 46-year-old middle school principal in a small community in the Southeast. Over the past year, Ms. Jones began to experience swallowing difficulties, hand weakness, and falls. Although she had comprehensive insurance, she avoided her primary care provider who had often attributed various symptoms to stress, which she found dismissive. After a workup was inconclusive, she sought a consultation from a neurologist at an academic medical center. It was hard to schedule because they were only available during work hours, and travel to and from appointments at the center took over an hour. Over several months, the diagnosis of amyotrophic lateral sclerosis (ALS) was finally made.

Ms. Jones experienced shock with the diagnosis, then developed situational depression that was managed with antidepressants. She worries about getting equitable care from her healthcare provider. She makes sure to inform anyone she meets with that she has full insurance to cover care. She has many questions about the cause of ALS and the burden it will place on her family and community. Ms. Jones seeks out support from other patients with ALS who live outside of urban settings. She wants to meet people of a similar age, stage, and culture who are going through similar struggles. She has discussions with the ALS team about advance care planning, specifically about a tracheostomy and a gastrostomy tube. She wants to consider the religious and spiritual implications and meets with her pastor for spiritual support. An insurance-based RN case manager is assigned to help navigate care. A meeting is arranged with physical therapy to work on strength training and a nutritionist to discuss strategies to manage dietary needs. The ALS team refers her to the palliative care clinic.

Following an appointment with a palliative nurse practitioner, a comprehensive assessment indicates that Ms. Jones continues to have depressive symptoms. She is struggling with weakness and fatigue, has forgotten her prescribed medications, and is trying to figure out how much longer she can remain an active principal. She is worried about her family, her spouse, her young children, her employment, and her long-term and short-term disability insurance. A referral is made to social work, child life, and chaplaincy. Social work offers resources to Mrs. Jones including durable medical equipment, assistive devices, and information on disability. Child Life offers support to her children. The chaplain performs a life review with Carlotta.

With the help of the palliative care team, Ms. Jones experiences less anxiety and depression and is less overwhelmed. Her spouse is relieved by the provision of physical, psychosocial, spiritual, and emotional support. A community has been organized to help with respite care and support the children. Overall, the patient-centered and family-focused care plan alleviates their worry about constantly renegotiating goals of care.

Case Analysis Questions

1. What attributes of palliative care are evident in this case?
2. Review Fig. 53.2. How do the domains and interrelated concepts (shown in the illustration) apply in this case?

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CONCEPT 54

Population Health

Elizabeth Reifsnider

Population Health is a significant concept that, in the wake of the 2020 to 2021 COVID-19 pandemic, has increased its importance and is emerging for nursing's adaptation to new ways to assess, diagnose, plan interventions, and evaluate; in other words, conducting the nursing process. Although nurses are well equipped to use the nursing process for individuals, population health will require the same ability to perform assessments of populations, diagnose population-level problems, plan and complete interventions for a specified population, and then evaluate the success of the intervention and revise accordingly. COVID-19 and its persistence among the world's population is an illustration of the importance of understanding population health. The pandemic does not respect boundaries, and a systematic, coordinated response is necessary to deal with pandemics. Nurses can be leaders in population health and model how to address diseases that affect a population when they understand how to practice population health.

To be effective practitioners at the population level, nurses must understand many other concepts presented in this text. Health disparities and social determinants of health occur among populations but are expressed as individual health outcomes. Healthcare organizations must attend to the health of the populations they serve, or they will not succeed in delivering care that is high quality, patient-centered, cost-effective, and evidence-based. Health policy should strive to improve the health of the population or at least address the health needs of the population. Improving population health is not a simple task. The complex causes of robust or ill health means that many different interventions and approaches are necessary. These interventions and approaches can vary from funding policy and legislation at the national level down to health behavior of individuals and local healthcare agencies.[1]

Nursing care is increasingly moving from acute care institutions (tertiary care medical centers) toward the community. Many patients that previously would have been hospitalized for an extended period are being treated for the most acute problems and then discharged to home and community care. Other health problems are addressed through outpatient surgery or at smaller, emergency health centers. As the need for nursing care moves into the community, nurses will need to understand how to address the health needs of the population and plan for care delivery. Population health is an approach to health that aims to improve the health of the entire population and to reduce health inequities among population groups. To reach these objectives, it looks at and acts upon the broad range of factors and conditions that have a strong influence on our health.

DEFINITION

Health means many different things to many people, and the same is true for the term "population". If you consider how people think about health, their conceptions of health can vary from health as being free of illness, to the ability to do daily work, to having total well-being.[2] When one thinks of population health, it needs to be viewed as not only being free from disease but the ability to adapt, respond to, and control health challenges.[3] The World Health Organization (WHO) in its 1946 charter defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[4] The same confusion about meaning can occur with "population." Population is commonly used to mean the number of people living in a certain geographic area (e.g., the population of this town is 34,562), but when considering population health, it often means individuals having characteristics in common, such as individuals with type 2 diabetes who all live in a specified area.[5] Population health considers the health outcomes of a group of people,[1] and nurses who are concerned about improving the health of the group need to understand how to address health care and health outcomes at a population level.

The definition of population health was first coined in 2003 by Kindig and Stoddart as the means to consider the health outcomes of a group of people and to understand how health outcomes (illnesses or less than desired health) are distributed among the group.[6] Although it may be convenient to think of health as a steady state, a population health approach views health as a capacity or resource which allows someone to acquire skills and grow into being able to pursue one's goals. When health is seen in this manner, population health can be seen as the range of social, economic, and physical environmental factors that benefit and contribute to health.[3]

To illustrate how to think about population health, it is first important to define which population is of interest to a nurse. Multiple salient populations emerged during the pandemic, all of whom are significant to nurses with different specialties. Populations can be defined as *a geographic entity* (all who live in city, county, state, nation, continental region) or as *a community of concern* (healthy young people, older sicker people, people with preexisting health conditions, pregnant people, immunocompromised people, etc.); all these groups had different responses to the COVID-19 pandemic. For each of these populations, nurses needed different approaches and skills to respond to the needs of the population.

It became apparent in acute care that some nursing practices were more effective at reducing mortality than others, and although nurses were caring for only a few patients at a time, the best way to promote healing was to consider all patients as a population and devise nursing care that best addressed the population. For example, a team approach to use prone positioning improved mortality rates of patients with acute COVID-19, which illustrates that considering all patients with COVID-19 as a population and seeking treatment to improve respiration can result in improved care.[7] This is an example of conceptualizing populations of concern (acutely ill).

At the other end of the care spectrum, geographic populations also must be considered. How can health protection be promoted in a large population when exposed to a new virus? Community-wide approaches are needed and emerged as social distancing, mask recommendations, closure of venues where virus spread was prevalent (schools, restaurants, places of social gathering, etc.).

It may be helpful to consider the definition of population health as the health of groups of people, composed of the physical, social, and economic environments that surround them and influence their health outcomes. In Canada, population health is defined by the health of a population, measured by health status indicators, and influenced by the environments that surround the population as well as individual health practices, genetics and biology, early childhood development, and access to and delivery of health services.[8] In the United States, population health, as defined by the Centers for Disease Control and Prevention (CDC), is an interdisciplinary approach that allows health departments to align practice to policy to influence health locally.[9] The goal of the alignment is to connect partnerships among healthcare providers, academia, business, and local government to achieve positive health outcomes. Focusing on population health allows significant health concerns to be recognized and addressed to overcome issues that create poor health conditions among the population.[10]

Since the concept of Population Health is relatively new, its definition varies, and people may mean different things when they discuss population health. For this concept presentation, Population Health is defined as "*…health outcomes of a defined group of people along with the distribution of health outcomes within the group.*"[11] Health equity, the realization that all people may achieve the same health outcomes if provided with equal opportunities is essential to understanding population health. The WHO believes health equity infers that everyone should have a fair chance to attain their full health potential and that no one should be disadvantaged from achieving this potential.[1]

SCOPE

As indicated by the concept of a population, which conveys the meaning of people in a defined group (e.g., population of a city, county, state, nation, etc.), the scope of population health can be very broad (i.e., the health of the population of the United States) or very narrow (i.e., the health of the population in a defined census tract or in a specific hospital unit) (Fig. 54.1). The scope is malleable and can refer to whatever grouping of people is chosen by the lens of an organization that is interested in the population's health under its purview. In addition to the number of people within a defined population grouping, the scope of population health also refers to the health issue that is being examined. If a healthcare organization wants to study the health of the population for which it is responsible, it may want to know the prevalence of chronic diseases among the population, or the incidence of preventable communicable diseases, for example. Many different organizational units study population health at distinct levels, or subunits of a population (e.g., all adults ages 65+) to determine the status of the population's health as well as to establish goals for health improvement. For all these examples, the scope will vary. It is essential that nurses understand the scope of the population being considered to know the appropriate metrics for measurement and potential treatment approaches.

ATTRIBUTES AND CRITERIA

The concept of Population Health is centered on its emphasis to maintain and improve the health status of the population. In addition to maintenance and improvement, population health also seeks to reduce health disparities and create health equity. According to the Canadian Ministry of Health, whose approach to population health is more robust and developed than is the United States' approach, the major attributes of population health are:[12]

1. Knowledge of the population to be served
2. Deciding on the key indicators of health to use for population health evaluation

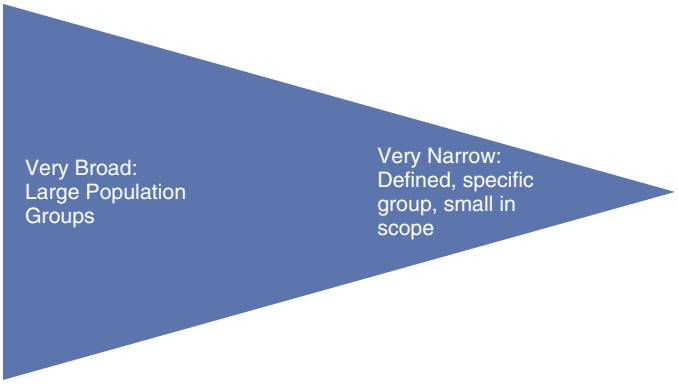


FIG. 54.1 Scope of Concept: Population Health.

3. Addressing determinants of health to link health concerns to their determinants
4. Using the best evidence on which to base population health management
5. Balanced decisions between levels of concern (family, community, employment, larger society)
6. Investing in disease prevention, health protection, and health promotion to lessen development of preventable and chronic diseases
7. Ability to fulfill role in an interprofessional team
8. Effective communication/health literacy education on emergent issues facing a population.[13]
9. Collaborating across sectors (such as government agencies, local healthcare organizations, individual health care practitioners, etc.) to build alliances for health.
10. Applying multiple strategies to address health disparities and guide interventions focused on a population level.
11. Increasing health literacy and involving the public in creating strategies to address population health improvement.
12. Evaluating health outcomes and reporting results and health statistics.

The major criteria for population health are that it is comprehensive: it not only evaluates health status of a population but also addresses how to improve the population's health in collaboration with the population involved. Although it includes acute as well as chronic illnesses in its evaluation, disease prevention and health protection and promotion remain its key emphasis. Population health strives to ensure the highest level of wellness among the population.

THEORETICAL LINKS

The theories that are most closely linked to Population Health are the Social Ecological Model of Health (also known as the Socioecological Model) and the Social Determinants of Health conceptual framework. These two conceptual frameworks are also closely related to each other and mirror many of the same concepts.

Socioecological Model

The socioecological model is based on the Ecology of Human Development, a conceptual model that was advanced by Bronfenbrenner.[14] This framework strives to explain how children develop though interactions with parents and family and the interactions that parents have with environments where the child is not present, but these environments influence the child's development through their influence on the parents. In this theory, human development is examined by focusing on three aspects: (1) an individual's perspective of the environment; (2) the environment surrounding that individual; and (3) the dynamic interaction between the individual and the environment.[15] Thus, development is defined as an ongoing change in the way a person perceives and deals with or adapts to the environment.

The Ecology of Human Development was adapted by multiple researchers into a Social-Ecological Model (SEM) that is broader than one focused on child development but retains the emphasis on the dynamic interaction between an individual and the environment surrounding the individual. In broad strokes, a SEM can be conceptualized as nested circles with the individual and his/her unique characteristics as the innermost circle. Fig. 54.2 depicts this model, showing the individual in the center, and with environmental levels surrounding the individual in ascending order including: family/close peers, neighborhood, organizations/work, larger community of residence, physical environment of residence (and the environment of all the descending circles), government, and culture.[15,16]

Social Determinants of Health Conceptual Framework

The conceptual framework of Determinants of Health is also closely related to Population Health. According to the Centers for Disease Control and Prevention[17] and *Healthy People 2020,*[18] the determinants of health consist of biologic, socioeconomic, psychosocial, behavioral, and social in nature. They are displayed as:

- *Biology and genetics.* Examples: sex and age
- *Individual behavior.* Examples: alcohol use, injection drug use (needles), unprotected sex, and smoking
- *Social environment.* Examples: discrimination, income, and gender
- *Physical environment.* Examples: where a person lives and crowding conditions
- *Health services.* Examples: Access to quality health care and having or not having health insurance

The World Health Organization's Commission on Social Determinants of Health[19] portrayed their conceptual model as linked boxes leading to the distribution of health and well-being among a population. The socioeconomic and political context (governance, health policy, and social/cultural norms and values) influence the individual level of social position, education, occupation, income, sex, gender, and race/ethnicity, which are

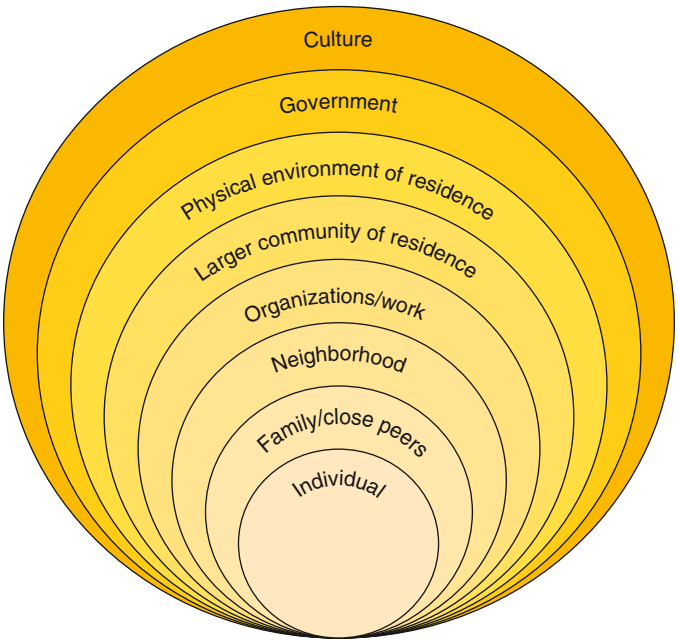


FIG. 54.2 Socioeconomic Model.

affected by the next level of material circumstances, biologic factors and behaviors, all of which, through the healthcare system, lead to the distribution of health and well-being. An imbalance in any of these factors can have a detrimental effect on health and well-being. If someone lives in a social environment that does not support health promotion or disease prevention, has a low income and poor health literacy, and develops a chronic illness through genetic predispositions allied with poor health behavioral choices, their health and well-being will suffer. Population health draws its theoretical foundation from these understandings; that an individual's health is influenced by the multiple social and environmental factors that surround the individual. Factors are not equally distributed, and their lack of equitable distribution leads to poor health for some, and access to health services is an important element in assuring health and well-being on a population level.

CORE COMPETENCIES

Population Health

- Define and assess a target population using health data.
- Identify health needs, disparities, and priorities of the target population and establish metrics to measure and document improvements in health status.
- Identify gaps in community resources and collaborate with partners to fill the gaps.
- Collaborate with community stakeholders and other healthcare professionals to develop an action plan that addresses the community needs within the context of available resources.
- Apply evidence-based approaches to implement the action plan and evaluate continual improvement of interventions.
- Advance population health policy that addresses population health needs.
- Apply population health principles as a foundation for responding to public health emergencies.

From: Kaprielian, VX, Silberberg M, McDonald, MA, et al. (2013). Teaching Population Health: A Competency Map Approach to Education. *Academic Medicine, 88*(5), 626-637.

CONTEXT TO NURSING AND HEALTH CARE

Population health in the context of nursing and health care is apparent in multiple areas. It varies depending on a nurse's scope of responsibility and general area of practice. A nurse working in acute care with a defined population (such as neurologic intensive care) may not realize that he/she is practicing population health when the nurse wonders why more elderly neurologic patients are referred to the unit than younger patients. The nurse may think of how neurologic patients need different rehabilitation services than will patients with other conditions, and they become the population of focus. Population health should not be viewed as a concept that applies only in the abstract or at a national/global level, but also in daily practice. Populations exists at all levels of a social-ecological model and at each level, nursing care is needed. Nurses assess the health of a defined population and strive to improve the health of that population. Nurses use population health concepts in all aspects of their practice, from wondering if a patient has symptoms of a communicable disease to conducting population-wide evaluation of the prevalence of communicable diseases. Nurses apply population health when they work at all levels of health care, from a unit and hospital level of population up to national level or global level (Table 54.1).

Community/Public Health

A particular context in which nurses practice population health is in public health nursing and in community health nursing.[20] The Quad Council Coalition (QCC) of Public Health Nursing Organizations is composed of four organizations that set a national policy agenda for public health nursing. The organizations that comprise the QCC are the Association of Public Health Nurses (APHN), the Public Health Nursing Section of the American Public Health Association (PHN Section), the Alliance of Nurses for Healthy Environments (ANHE), and the Association of Community Health Nursing Educators (ACHNE). The QCC published competencies for nurses who work as community or public health nurses,[21] and the competencies describe daily functions in community organizations and state and/or local public health agencies. The functions include home visiting for acute, chronic, or follow-up care or population-based services such as immunization clinics for schoolchildren or holding community-wide immunization clinics for influenza prevention. Community/public health nurses work directly with at-risk populations carrying out disease prevention, health protection, and health promotion efforts at all levels of prevention (primary, secondary, tertiary). They also conduct basic data collection and contact follow-up on communicable incidence and prevalence, fieldwork such as planning, implementing and/or evaluating health education programs for diverse groups, program planning, implementation and evaluation, outreach activities to ensure that populations at risk receive referrals to needed service, and conduct assessment of population needs. The emphasis in the practice of community/public health nursing is on assessment of population health needs, assurance that these health needs are met, and policy development to reduce health risks to populations.

Public Health Nurses

Although the competencies are the same, there are differences between community health and public health. Public health is part of a recognized public unit (state, county, city, etc.) and is legally responsible for ensuring the public's health. Public health workers conduct many different functions but commonly emphasize infectious disease prevention and eradication, monitoring environmental factors like water quality and air pollution from a health perspective, or working with policymakers to address a wide range of wellness issues. Nurses in public health work to assure conditions that will allow for optimal health. They practice *disease prevention*, prevention of the spread of disease through immunizations; contact follow-up and treatment for those who have been exposed to infectious diseases such as syphilis or tuberculosis; *health protection,* providing education to public groups on the importance of health protective practices such as injury avoidance, skin cancer prevention and screening, or tobacco cessation and avoidance; and *health*

TABLE 54.1 POPULATION HEALTH AND RELATED PRACTICE AREAS

Focus Area	Definition
Population Health	The health outcomes of a defined group of people and how the outcomes are distributed throughout the group.
Public Health	An emphasis on disease prevention, health protection, and health promotion using evidence to benefit society, usually supported by government agencies.
Community Health	A collaborative enterprise that is comprised of multiple sectors in the community as well as an interdisciplinary approach that uses public health sciences and evidence to work with communities to benefit the health of all members of the community.[21]
Global Health	Evidence based disease prevention, health protection, and health promotion on a global scale, accomplished through collaborative efforts of sovereign countries.
Population Health Management	Efforts by healthcare organizations, accountable care organizations, and insurers keep individuals as health as possible for as long as possible.

promotion, health education programs on the importance on healthy diets for children along with types of and places for physical activity that will improve overall health. Effective public health nurses emphasize disease prevention and health promotion for the whole community, as defined by political unit. Public health nurses aim to create better conditions for health aimed at the environment, human behavior and lifestyle, and access to health care.

Public health is the traditional home for nurses who enjoy working with a focus on population health. As illustrated earlier in this chapter, public health is concerned with the health of the population and strives to prevent disease, protect health, and promote health in an entire population as well as in specific subpopulations that are at risk for poor health based on social determinants of health. On a routine basis, public health nurses conduct home visits and provide many ambulatory clinic services (immunizations, well baby, sexually transmitted infections, prenatal care), as well as respond during infectious disease outbreaks through contact follow-up, screening, treatment, and communicating with community groups. Public health nurses work at city, county, state, and national level and at each level they assess the health of the population, provide assurance that the population receives the needed services, and promote health policy adoption among communities.

Community Health Nurses

Community health nurses (CHNs), although adhering to the same competencies as public health nurses, often have a broader area of responsibility. Community health nurses may take responsibility for addressing health equity and social determinants of health through working for community or faith-based agencies that are not affiliated with any government or political unit. Community health nurses may center their practice on increasing a population's access to healthy food, after-school activities, and working to create common spaces that promote community well-being.

Collaboration is essential in community health nursing and the CHNs need to be knowledgeable about coalition-building and community efforts that build community agency to solve problems. They may work with community organizations, school systems, faith-based organizations, local governments, healthcare providers, etc. to accomplish these goals. One thing that public health nurses and community health nurses have in common is a great need for cultural awareness and cultural humility, since they work with all members of a community and respond to requests for services, from home visits to policy work, in response to community needs. Both community health nurses and public health nurses use evidence to meet the interests and needs of a community.

In the United States, nurses fill many roles in population health, and many more nurses understand how the term "population health" applies to all patients, families, communities, and organizations. Indeed, it is difficult to envision a healthcare system that does not consider population health in its mission and vision. Using the social-ecological model as a framework allows a perspective on the clinical applications of population health.

Hospitals and Ambulatory Clinics

Hospital and clinic management must understand the population metrics and health dynamics of the patients they serve to maintain viability. The type of patient mix, level of skilled nursing care needed for patients, specialty services, ancillary services, even the ebb and flow of ED admissions and discharges depend on the population who use hospital and associated clinical services. With changes in reimbursements tied to inpatient days, patient satisfaction, and readmissions, improving the health of the patient population within the hospital as well as its surrounding community becomes crucial for its economic survival. As more procedures shift from inpatient to outpatient, nurses employed in ambulatory care facilities need to understand how presenting patients may echo common health concerns within a specific subpopulation and be alert for issues that may be associated with subpopulations. Individual nurses employed by hospitals and clinics can improve the health of the population they serve by not only providing skilled nursing care but also reflecting on how their patients mirror the health of the population they represent.[22]

Home Settings

Although home health care (HHC), visiting nurse services (VNS), and hospice all conduct nursing care in the home setting, the population health applications may be different. HHC is often used for patients who need additional nursing care and are expected to return to wellness or learn from nursing instruction how to care for themselves but are no longer ill enough for hospitalization. The health of this population, with temporary

illness concerns, can be expected to return to a level of wellness that will enable them to become independent in their own health care. Community patients who receive home visiting services, such as Nurse-Family Partnership,[23] often represent an underserved and vulnerable population, such as low-income, first-time mothers. It is essential for nurses who practice home visiting services to understand the health and social risks faced by their population of focus and know how to apply health promotion and disease prevention practices to improve health outcomes for mothers, children, and families. Patients admitted to hospice typically are not expected to live more than 6 months. Patients facing terminal illnesses require a population focus on how to maintain social, spiritual, and family-focused attention to health. When nurses understand how health encompasses all levels of wellness and more than physical, population health for hospice patients can be achieved.

School Health

A focus on a population of children is necessary for optimum school health.[24] For many children, the school nurse becomes their only healthcare provider. School health nurses not only met the children's need for immunizations, health screenings, minor illness and trauma; the nurse must also be alert for signs of disease outbreaks and constantly monitor for disease prevention as well as teach health promotion. Health protection and injury prevention are important areas of practice as well. If the school nurse does not understand the population of children in the school and does not know the health issues of the community's population surrounding the school, the nurse will be ill prepared to protect and promote the children's health. In addition, the nurse needs to attend to the children's education and learning and determine whether health issues are undermining children's educational pursuits.

Case Managers/Care Coordinators

Managing the health outcomes of a panel of patients is the role of case managers and care coordinators. Nurses in these roles understand the healthcare needs of their panel and work to maintain the highest level of health for their patients. Population health in this context implies that the nurse knows the health issues experienced by a subpopulation very thoroughly and can promote their health to the most optimal level.

Population Health Management

Another context of population health for nurses is population health management. Population health management or population health care are sometimes used interchangeably with population health. These terms refer to a narrower meaning of population health than the concept covers. These terms tend to be focused more heavily on health and medical care and particular groups of patients.[1]

Population health management is the act of identifying and addressing the health of individuals within defined populations, but this can be done in many different ways.[25] Healthcare organizations (hospitals, clinics and ambulatory care agencies, nursing homes, hospice agencies), accountable care organizations, and insurers are vitally interested in providing the most efficient and cost-effective care for the populations they serve. Nurses participate in population health management through using data to stratify patients by risk, develop insights into obstacles faced by some portions of the community, and target interventions to certain subpopulations to produce the best results for the population of interest.[25]

A population health management effort involves developing realistic, scalable population health programs for segments of the population that the agency serves, such as diabetes management programs for diabetics. In addition to health programs, individualized treatment plans that recognize determinants of health (social, cultural, environmental, behavioral) may be needed when health education and support are insufficient to improve health. Patient-centered care plans, although sharing a population health focus, acknowledge barriers that may be present for some segments of the population that hinder them from accomplishing disease prevention, health protection, and health promotion efforts.[26] Successful population health programs can be accomplished when patients are engaged and have the resources needed to adhere to treatment plans.

Community collaborations and creating links across all sectors of health care are essential for population health management. Gaps in care can exacerbate any underlying health problems or lead to a worsening of a previously stable health issue. Collaboration and linkages can allow a healthcare organization to continue to address health problems even when an individual is no longer receiving care from the organization. As insurers see the benefit of keeping people healthy and supporting their care in a community setting, more focus is given to population health management outside of tertiary care centers. Often nurses function as care coordinators or case managers to address healthcare needs of specialized populations. These nurses are practicing population health management while they address the healthcare needs of the patients on their caseload to meet the goal of keeping them as healthy as possible and to maintain their outpatient status if feasible. Collective action with community social networks can leverage individual nurses practicing population health management by linking those who need social support with others. This has been associated with improvements in people's mental health and emotional well-being, and reductions in social isolation.[1]

INTERRELATED CONCEPTS

Several concepts presented in this text are related to population health. The most closely related are illustrated in Fig. 54.3, and their relationships are described in more detail. **Public Health Emergencies** can be declared by the Secretary of the Department of Health and Human Services if it is determined that a disease or disorder presents an emergency, or a significant outbreak of infectious disease or terrorist attack has occurred (Section 319 of the Public Health Service Act).[27] **Health Promotion**, along with health protection (e.g., seat belt use, food and water safety, pollution reduction) and disease prevention (e.g., vaccinations, recall of tainted foods), contribute to improving health among a population of individuals. Illnesses can spread quickly among populations, and protection and prevention are essential to

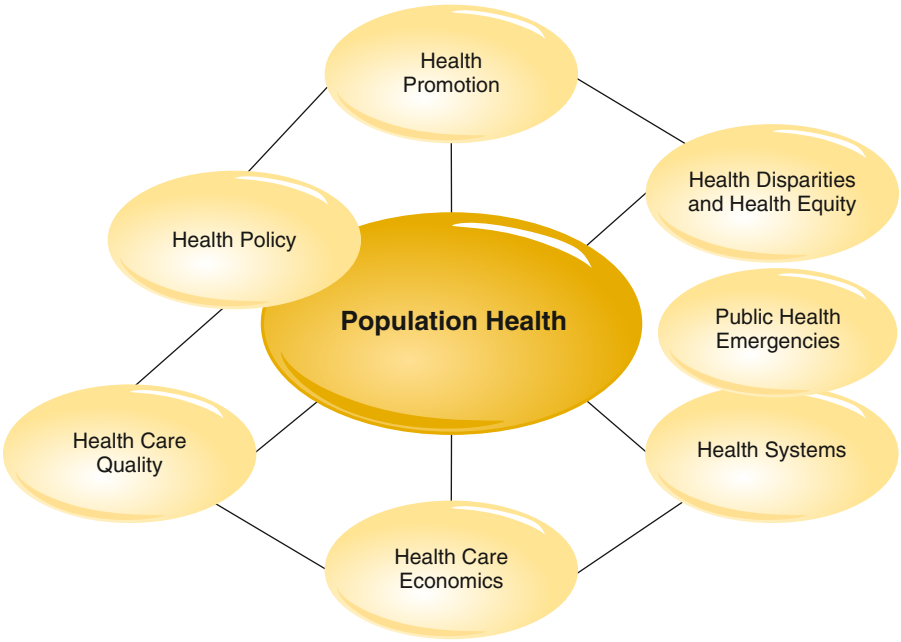


FIG. 54.3 Population Health and Interrelated Concepts.

prevent mortality and reduce morbidity. Health promotion is geared to help populations achieve and maintain their highest level of wellness so they can be resilient in the face of illness. The concept **Health Disparities and Health Equity** is also closely related; disparities threaten the health of populations, since they cause unequal distributions of illness based on where people live, work, and spend free time. When health disparities are present, some populations are less resistant to disease and more likely to suffer preventable illnesses or succumb to earlier morbidity and mortality. **Health Systems** can contribute to improving population health through their attention to health disparities among the populations they serve. When systems of care focus on common causes of illness among their patients to reduce the prevalence of the illnesses, they must examine the commonalities among the population they serve. This in turn leads to improved **Health Care Quality** in that better quality of care can improve the health of specific populations or a segment of a certain population. **Health Care Economics** support the existence of healthcare organizations and drive healthcare quality. Prevention is cheaper than cure, but the prevention must be spread throughout a population and have a population focus for it to be effective. **Health Policy** underpins all these concepts because policy sets the direction for action. If health policy emphasizes health promotion for all the population and creates goals and metrics to reduce health disparities, then health for all can be achieved. This summarizes how population health allows us to consider how everyone's health is eventually connected.

CLINICAL EXEMPLARS

Considering that population health represents health outcomes of groups of people, there are countless potential exemplars represented by this concept. Some of the most common exemplars of Population Health are presented in Box 54.1, but these in no way represent a comprehensive list. In the section that follows, a few of these exemplars are briefly presented.

BOX 54.1 EXEMPLARS OF POPULATION HEALTH

- Prevention of Accidents and Suicide
- Communicable disease prevention
- Food and restaurant inspections
- Health data collection and statistics
- Health planning and administration
- Immunizations
- Infection control in hospital settings
- Noncommunicable disease prevention
- Public health laws (e.g., seatbelts and car seats)
- School-wide screenings and vaccine administrations
- Substance abuse education and prevention

Featured Exemplars

Prevention of Communicable Diseases

In the recent past, new infectious diseases such as COVID-19 emerged and rapidly spread among the population. Other diseases that have a long history with humans, such as tuberculosis, have adapted and are still causing millions of deaths each year.[28] Only a population health focus, where everyone is considered "at risk" and in need of health protection and disease prevention, can stem rising morbidity and mortality. Maintaining constant surveillance with a population health mindset is the initial line of defense against the emergence of potentially deadly infections.

Immunization

Immunization is the most effective means to prevent communicable disease because immunization protects an individual from becoming infected with the disease-causing agent. The most

effective way to become immunized, other than contracting the disease and surviving it, is to become vaccinated against the disease. Bacteria and viruses do not respect geographic, political, economic, social, or any other types of artificial boundaries created by humans. But for immunization to be effective on a population health level, 90% of the population needs to be immunized to prevent the spread of an infectious agent. This is known as "herd immunity."[29]

Prevention of Noncommunicable Diseases

Of the top 10 leading causes of death in the United States, 5 are from noncommunicable diseases that can be addressed through health promotion, which is an essential component of a population health approach. Heart disease (#1), chronic lower respiratory disease (#4), stroke (#5), diabetes (#6), and end-stage renal disease (#9) can be addressed through maintaining healthy weight, being physically active for 150 minutes weekly, avoiding tobacco, and little or no alcohol intake.[30] The most effective ways to reduce these diseases is through widespread publicly available health education, community approaches to creating healthy lifestyles, and policies that advocate smoke-free environments.

Substance Abuse/Misuse

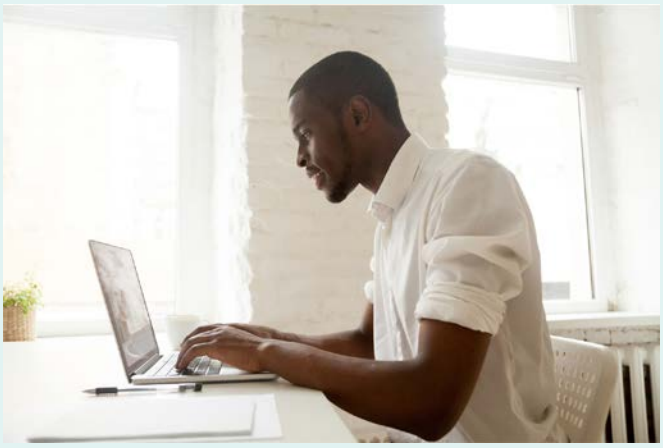
Community programs and local policies have reduced rates of substance abuse initiation and harm. Prevention programs that are coordinated by community agencies such as schools, healthcare systems, faith organizations, and social service organizations can deliver comprehensive and unified prevention programs than can be sustained over time. When a community unites to address the problem at a population level, which acknowledges that all individuals may be at risk, then programs can be established that reach more people than individually focused treatment efforts. Prevention programs and interventions can have a strong effect and be cost-effective, but only if evidence-based components are used and if those components are delivered in a coordinated and consistent fashion throughout the at-risk period.

Accidents and Suicide

Accidents and suicide (unintentional and intentional harm) are, respectively, the third and tenth leading causes of death in the United States.[31] Both are closely related to substance abuse when alcohol abuse is also considered as a substance abuse. Safer roads and automotive vehicles have reduced vehicle accidents along with more severe penalties for driving under the influence of alcohol. Although most suicide attempts are through intentional drug overdoses, when firearms are used, they are the most lethal, with 85% of suicides succeeding when firearms are used.[32] Prevention strategies for suicide are directed to building community capacity (to create supportive, protective environments) and strengthening economic supports among other strategies.[33]

CASE STUDY

Case Presentation



Kris is a public health nurse in a small county health department and is responsible for all public health nursing functions in the county. Kris reads the *Morbidity and Mortality Weekly Report* from the CDC highlighting public health investigation, along with providing reports and recommendations derived from science-based research.[34] Kris realizes that rates of COVID-19 are rising in all locations and prepares for an outbreak of it in the county. Kris is notified by a local healthcare provider that a patient admitted to the hospital has just tested positive for COVID-19, a communicable disease that is required to be reported to the county and state health departments and to the CDC. Kris also knows that it is highly contagious and needs immediate follow-up. Kris contacts the healthcare provider, who supplies the patient's name and contact information. Kris knows that his priorities are to respond to clinical inquiries from a worried public and reduce transmission spread by advocating and providing masks through public media (websites, newspapers, radio, television, and social media). When the vaccine becomes available, Kris sets up vaccination clinics with assistance of healthcare agencies and volunteers and monitors distribution and safety. Kris is also the health department liaison to the larger state health department and occasionally to the CDC. Kris practices population health by working at a system and society level of the ecological model to promote and protect health and to prevent disease for the county's population.[35]

Kris knows that communicating the news to the public without panic, setting up vaccination clinics and additional immunization clinics, and advocating for masks and other protection measures is more than one public health nurse can do. Kris calls upon the resources of the state health department to assist with communication, contact follow-up, and establishment of additional clinics because the state health department is responsible for disease prevention and health protection by addressing all communicable diseases in the state. With Kris' prompt action and population health focus, the county was able to avoid overwhelming their health system and save lives.

Case Analysis Questions

1. How did Kris utilize the Social Determinants of Health in deciding where to establish vaccination clinics?
2. How would Kris use the Social Ecological Model to make decisions about health protection and health promotion?
3. How did Kris practice assessment, assurance, and health policy implementation?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 55

Public Health Emergencies

Mary Pat Couig and Roberta P. Lavin

Public health emergencies and disasters have had a profound effect on the lives of all peoples around the globe, especially over the past two and a half with four years. While this chapter will focus on these issues in the U.S. (which resulted in 10,492 deaths and cost about $252 billion dollars in losses in 2021), it is important to underscore that public health emergencies have occurred on every continent except Antarctica.[1-2] Approximately 40% of natural disasters occurred in Asia (Fig. 55.1).

On January 20, 2020, the Centers for Disease Control and Prevention (CDC) confirmed the first U.S. case of COVID-19.[3] The U.S. death toll for the COVID-19 pandemic reached one million just over 2 years later.[4] The number of billion-dollar climate and weather disasters in 2021 was the largest since the National Oceanic Atmospheric Administration (NOAA) started tracking weather events, and these disasters included 11 storms, 4 tropical cyclones, 2 floods, and 1 each of droughts, wildfires, and winter storms (a total of 20 events). These events (Fig. 55.2) resulted in the deaths of 724 people and were estimated to cost $148 billion.[5] The pandemic and these disasters have affected almost all Americans; additionally, the pandemic has strained the healthcare system in ways that have short-term effects and the potential for lasting effects, e.g., health system financial losses, patient outcomes and delayed care, and issues related to healthcare staffing.[6]

As the largest group of health professionals in the U.S., it is highly likely that all nurses will be affected by and will need to respond to a public health emergency during their career. Given the public health consequences of these events and the costs to society, it is important to understand the concept of public health emergency preparedness, how it relates to health and public health, and how you can be a prepared nurse.

DEFINITION

Although there are many definitions of disaster and public health emergencies, three well-accepted definitions are presented. Nelson and colleagues define public health emergency preparedness (PEHP) as: *the capability of the public health and health care systems, communities, and individuals, to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities.*[7]

This concept term incorporates a definition of disasters, mission areas from the *National Preparedness Goal* (prevention, protection, response, and recovery), and phases of emergency management (preparedness, response, and recovery).[8] The Federal Emergency Management Agency (FEMA) defines a disaster as "*An occurrence of a natural catastrophe, technological accident, or human caused event that has resulted in severe property damage, deaths, and/or multiple injuries.*"[9] The International Federation of the Red Cross defines disasters as "*serious disruptions to the functioning of a community that exceed its capacity to cope using its own resources. Disasters can be caused by natural, man-made and technological hazards, as well as various factors that influence the exposure and vulnerability of a community.*"[10]

A public health emergency, as defined in the 2001 Model State Emergency Public Health Powers Act, is *"an occurrence or imminent threat of an illness or health condition" caused by one of several factors, including bioterrorism or a novel or previously eradicated pathogen, that "poses a high probability of the following harms: (i) a large number of deaths in the affected populations; (ii) a large number of serious or long-term disabilities in the affected population; or (iii) widespread exposure to an infectious or toxic agent that poses a significant risk of substantial future harm to a large number of people in the affected population."*[11]

SCOPE

When most people think of a public health emergency, they often consider infectious diseases that can range from local to global, but the scope is much broader than infectious disease. The scope of public health emergencies is based on cause and magnitude (Fig. 55.3).

From the context of cause, there are two primary categories: natural disasters or human-made disasters. Natural disasters include numerous weather-related events (hurricanes, tornadoes, droughts, wildfires, winter storms, and floods), earthquakes, volcanic eruptions, and biologic (epidemics and

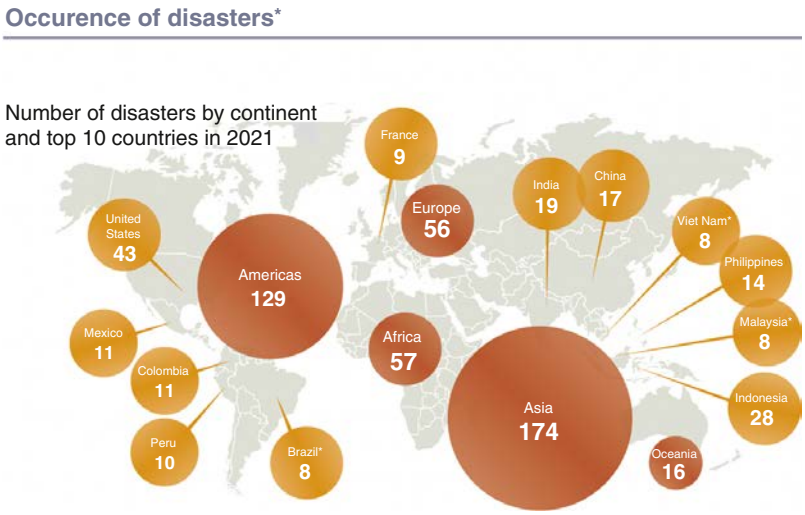


Fig. 55.1 Occurrence of Disasters. (From: CRED, 2021, p. 4.)

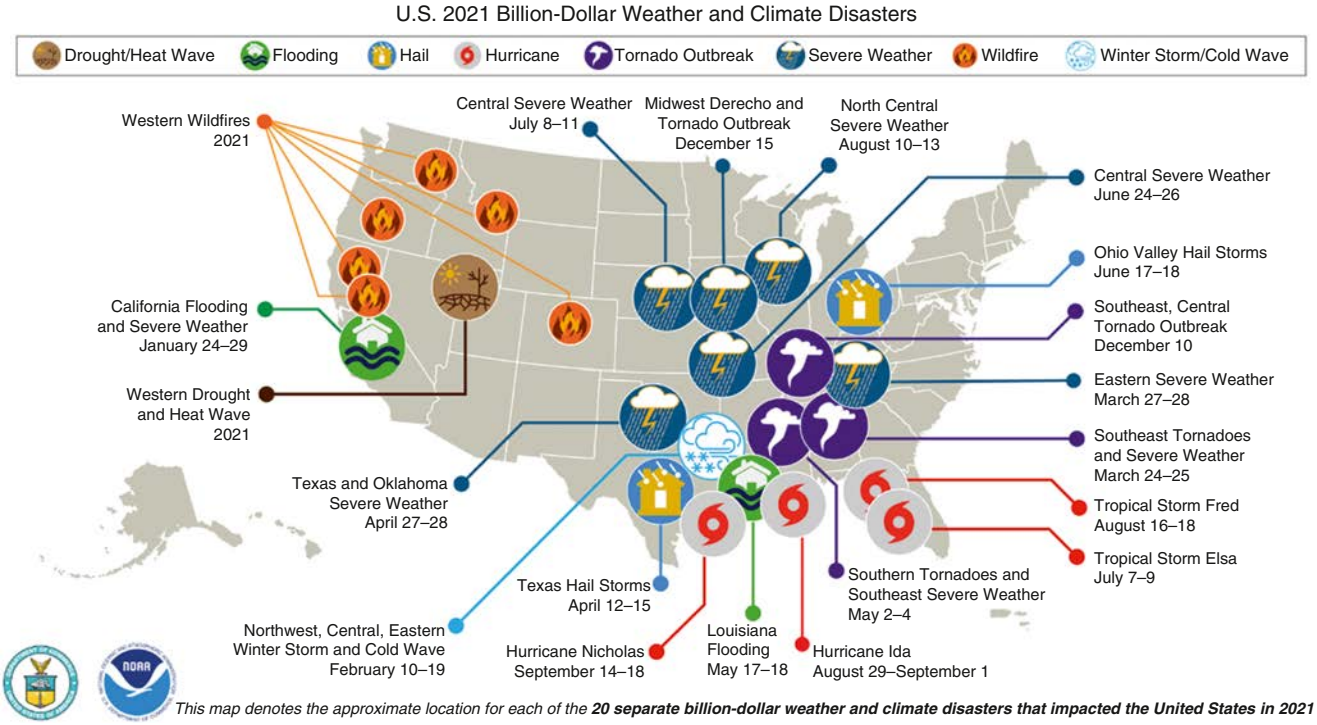

U.S. 2021 Billion-Dollar Weather and Climate Disasters
Drought/Heat Wave
Flooding
Hail
Hurricane
Tornado Outbreak
Severe Weather
Wildfire
Winter Storm/Cold Wave
Western Wildfires 2021
Central Severe Weather July 8–11
Midwest Derecho and Tornado Outbreak December 15
North Central Severe Weather August 10–13
Central Severe Weather June 24–26
Ohio Valley Hail Storms June 17–18
Southeast, Central Tornado Outbreak December 10
Eastern Severe Weather March 27–28
Southeast Tornadoes and Severe Weather March 24–25
Tropical Storm Fred August 16–18
Tropical Storm Elsa July 7–9
Southern Tornadoes and Southeast Severe Weather May 2–4
California Flooding and Severe Weather January 24–29
Western Drought and Heat Wave 2021
Texas and Oklahoma Severe Weather April 27–28
Texas Hail Storms April 12–15
Northwest, Central, Eastern Winter Storm and Cold Wave February 10–19
Hurricane Nicholas September 14–18
Louisiana Flooding May 17–18
Hurricane Ida August 29–September 1
This map denotes the approximate location for each of the 20 separate billion-dollar weather and climate disasters that impacted the United States in 2021

Fig. 55.2 U.S. 2021 Billion-Dollar Weather and Climate Disasters. (From: NOAA, 2022.)

pandemics). Human-made disasters include accidental (such as a nuclear accident, chemical or hazardous material spills, explosions, train accidents, plane crashes, or groundwater contamination) or deliberate (chemical or biologic attacks, technological, terrorism [weapon, or explosive, or cyberattacks], and war).

The magnitude of a public health emergency can vary and range from a localized area (e.g., a town hit by a tornado, displacing hundreds of residents) to a widespread event (involving a region, continent, or even the globe). The magnitude can change over time, depending on the underlying case. All disasters begin at the local level and, depending on the type of event, can remain local or spread to county, state, regional, national, tribal, or global levels. As an example, the COVID-19 pandemic initially was perceived as a localized event, which over the course of several months affected the entire globe.

ATTRIBUTES AND CRITERIA

An attribute is a characteristic of the concept or situations that occur as a condition of the concept. The definitions (presented previously) outline several attributes associated with public health emergencies. These attributes and criteria are distinct from an official, federal declaration of a public health emergency.[12] For a situation to qualify as a public health emergency there must be:

- A disaster (natural or human-made)
- Affects a population group

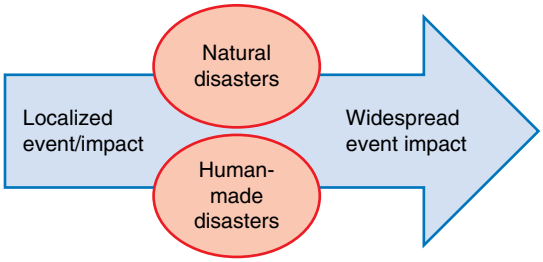


Fig. 55.3 Scope of the Concept: Public Health Emergency.

- Presents a danger to the health of the population affected
- Causes a disruption to the community
- Requires an intentional emergency response to have an optimal outcome

THEORETICAL LINKS

Conceptual frameworks are important, as they drive the way one approaches evidence and research. Two distinct conceptual frameworks provide the foundation for a public health emergency conceptual model, especially as it relates to nursing: Haddon's Matrix and the Crisis Conceptual Nursing Model.

Haddon's Matrix was created by William Haddon and was originally designed to address issues of highway safety.[13] He used the epidemiologic principles of an external agent, a susceptible host, and the environment in which the host and the agent come together.[14] Haddon specifically looked at the agent or vector of a hazardous event, the environment (physical and social), and the host in the context of the pre-event, event, and post-event.[15]

The Crisis Conceptual Nursing Model, led by Murphey and Fawcett, was an adaptation of crisis theory and the holistic view of nursing. The belief was that, if a person experienced a disaster and could not cope effectively, a crisis would ensue. The person would either change or adapt.[16]

In the Public Health Emergency Conceptual Model (Table 55.1), the work of William Haddon was combined with the work of Murphy and Fawcett and adapted to public health emergency nursing. This model follows the disaster cycle and incorporates the nursing process. In Haddon's model, the terminology is agent, host, and environment (physical and sociocultural), and in nursing, the terminology is person, health, and environment.

CORE COMPETENCIES

Public Health Emergency

- Identify changes in conditions that might indicate a disaster or public health emergency.
- Understand the effect of climate change on environmental and population health.
- Describe the health and safety hazards of disasters and public health emergencies.
- Describe the overarching principles and methods regarding personal safety measures, including personal protective equipment (PPE).
- Implement infection control measures and proper use of personal protective equipment.

From: American Association of Colleges of Nursing. (2021). *The essentials: Core competencies for professional nursing education.* https://www.aacnnursing.org/Portals/42/AcademicNursing/pdf/Essentials-2021.pdf

TABLE 55.1 Public Health Emergency Conceptual Model

Disaster Cycle – Stage	Agent/Host Environment – Nursing – Person, Health, Environment
Precrisis (Preparedness)	Goal: • Health promotion and disease prevention • Community preparedness (coordination, training, surveillance, preplanning)
Crisis (Response)	Goal: • Amelioration or cure • Responder health and safety • Legal and ethical decision making • Effective coordination and use of volunteers
Postcrisis (Response and Recovery)	Goal: • Rehabilitation, maintenance of an optimal level of health and support of dying • Optimal community recovery • Resume individual, family, community, and organization functioning

CROSS-CUTTING – NURSING PROCESS

Assessment	Planning	Implementation	Evaluation
• Identification of biophysical, psychosocial, and spiritual factors • Community resilience	• Priority setting and identification of goals	• Ego strengthening or general support • Mobilizing environmental sources of support • Actions taken in response to the community assessment	• Consider the state of dynamic equilibrium between the person and the environment • Current coping mechanisms reassessed after an intervention • Availability of critical public health, healthcare, and human services

Adapted from Lavin, R.P., Slepski, L., & Rettenmeier, L. (2012). Direction for nursing research and development. In T.E. Veenema (Ed.), *Disaster nursing and emergency preparedness for chemical, biological, and radiological terrorism and other hazards* (3rd ed.). New York, NY: Springer Publishing.

CONTEXT TO NURSING AND HEALTHCARE

Public health emergencies and disasters can happen anywhere, and the type of disaster or public health emergency depends on potential exposures and risks. For communities and individuals to have an optimal outcome following a public health emergency requires prior planning, excellent communication, interdisciplinary collaboration, and a responsive public. Further, it necessarily requires the collaboration of governments, systems, organizations, individuals, and a broad array of capabilities and competencies. An all-hazards preparedness focus, both personal[17] and whole community,[18] means an assessment is done to identify the risks, whether natural or human-made, the current capabilities and infrastructure, and any gaps that need to be addressed. Box 55.1 presents a framework for the systems and support that need to be in place for a prepared workforce by level of stakeholder—from federal and state governments, to system level stakeholders, to organizational stakeholders, to individuals.

Because a public health emergency is not a specific disease, the attributes that make an event a public health emergency are best explicated by examining the capabilities and competencies that are necessary to prepare for and respond to such an emergency. Box 55.2 compares the core competencies and attributes necessary for a successful disaster response from multiple organizations including the CDC *Public Health Emergency Preparedness and Response Capabilities,*[19] the *Core Competencies for Disaster Medicine and Public Health,*[20] *International Council of Nursing Core Competencies in Disaster Nursing,*[21] and the *AACN Essentials: Core Competencies for Professional Nursing Education.*[22] One cannot help but notice that there is no universal agreement. In fact, the nursing competencies never address the CDC's Public Health Emergency Preparedness and Response Capabilities (2019) of volunteer management, medical materiel management, medical countermeasure dispensing, or emergency public information.

BOX 55.1 Framework for Preparing Nurses for Public Health Emergencies

Government
- Federal, Centers for Disease Control and Prevention, National Institutes of Health, Department of Homeland Security
- State Agencies
- Regulatory (Food and Drug Administration, Centers for Medicare and Medicaid Emergency Preparedness Rule)

System
- Professional Accreditation Bodies (CCNE, ACEN, CNEA)
- Healthcare Accrediting Bodies (Joint Commission, National Commission on Correctional Healthcare)
- Regulatory Bodies (State licensing)

Organization
- Healthcare and Public Health Organizations (AHA, APHA)
- Institutions of Higher Education
- Professional Nursing Organizations (ANA, AACN, AAN, AANP, ENA, NLN, PHN, APHA etc.)
- Voluntary Organizations Active in Disaster (Red Cross, Catholic Charities, Save the Children, etc.)
- Regulatory (NCSBN)

Individual
- Practicing Nurse in Public Health and Healthcare Institutions
- Nursing Faculty
- Nursing Students
- Nursing Leaders (Deans, CNOs, etc.)
- Nurse Scientists

Adapted from Veenema, T.G., Meyer, D., Bell, S.A., et al. (2020). *Recommendations for improving national nurse preparedness for pandemic response: Early lessons from COVID-19.* The Johns Hopkins Center for Health Security. https://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2020/nurse-preparedness-report.pdf

Preparation

The National Response Framework, Department of Homeland Security (DHS), and Federal Emergency Management Agency (FEMA) provide a guide for how our country responds to disasters and emergencies, whether natural or man-made, in a coordinated manner that is "scalable, flexible, and adaptable…."[23] The approach is to focus on all hazards in the community and risk assessments to determine the priority risks. For example, for those states located on the Gulf Coast, hurricanes are a major threat. The states in the West and Southwest face a greater risk of wildfires, especially given the multiple years of drought. Preparation includes identification of risks and development of coordinated scalable plans to address the specific risks.

All nurses can prepare by having a personal/family preparedness plan. Numerous organizations provide guidance in developing these types of plans. At places of employment, nurses should ask about the types of risks that have been identified, plans for addressing those risks, and their roles in preparing for the risks. Nurses can volunteer to serve as their unit liaison to ensure all the nurses on a given unit understand the potential risks and have the necessary training to respond. Healthcare systems have emergency management committees to identify risks and develop plans for preparing, responding, and recovering from a public health emergency, and serving on one of those committees is an opportunity to be engaged in the process.

Response

During a disaster or public health emergency, the role of a nurse will depend on their place of employment and designated response role. For example, a nurse working in an emergency department may be assigned patient care or triage or may be assigned to another unit that requires assistance. The following examples illustrate the broad range of nurses' roles and responsibilities during a public health emergency or disaster.

Acute Care Facilities and Ambulatory Clinics

In addition to being prepared for facility degradation due to a flood, power outage, or earthquake, hospitals and other acute care facilities also need to be prepared for surge capacity due to a weapons, explosives, or biologic event such as influenza or other biologic exposure (viral or bacterial). Nurses should know their role during a public health emergency and, if needed,

request training to ensure they are able to fulfill their role, if activated. Facilities are located in communities and should be responsive to potential public health emergencies. Medical surge is defined as "…the ability to provide adequate medical evaluation and care during events that exceed the limits of the normal medical infrastructure of an affected community." It encompasses the ability of HCOs to survive a hazard effect and maintain or rapidly recover operations that were compromised—a concept known as medical system resiliency.[24] Surge capacity response plans should include emergency medical services, law enforcement, and the local public health department. In addition to planning, agencies should also train and exercise together to ensure coordinated efforts. The Department of Health and Human Services' Hospital Preparedness Program provides guidance for hospitals to be prepared.[25]

BOX 55.2 Comparisons of Competencies and Capabilities by Organization

CDC Core Capabilities (CDC, 2019)

- Community preparedness
- Community recovery
- Emergency operations coordination
- Emergency public information and warning
- Fatality management
- Information sharing
- Mass care
- Medical countermeasure dispensing and administration
- Medical surge
- Nonpharmaceutical interventions
- Public health laboratory testing
- Public health surveillance and epidemiologic investigation
- Responder safety and health
- Volunteer management

Core Competencies for Disaster Medicine & Public Health (Walsh et al 2012)

- Expected role(s) in organizational and community response plans
- Short- and long-term considerations for recovery
- Communicate effectively
- Principles and practices for the clinical management
- Surge capacity
- Personal safety
- Personal and family preparedness
- Situational awareness of actual/potential health hazards
- Legal principles
- Ethical principles

ICN Competencies

- Preparation and Planning
- Recovery
- Incident Management
- Communication
- Intervention
- Assessment
- Safety and Security
- Law and Ethics

AACN Competencies (AACN, 2021)

- Changes in conditions that might indicate a disaster
- Rapid response activities to protect population health.
- Impact of climate change
- Lead preparedness and mitigation efforts to protect population
- Planning, decision making, and evaluation
- Infection control
- Evidence-based infection control measures
- Health and safety hazards.
- Personal safety measures
- Ethical decision making

Long-term Care Facilities

Long-term care (LTC) facilities pose unique challenges during public health emergencies due to the vulnerability of their residents. Disasters in the past 5 years have demonstrated the challenges responding to and evacuating LTC residents.[26] In 2016, the Centers for Medicare and Medicaid Services (CMS) issued the *CMS Emergency Preparedness Rule*[27] to increase the mitigation and preparedness activities of LTC facilities to reduce these risks. The new requirements cover emergency programs, emergency planning, training, and testing requirements for inpatient and outpatient providers and suppliers. Nurses who work in LTC facilities should know their emergency operations plan and be prepared to respond in their designated roles.

On-site Responses (Deployments)

Nurses who are interested in deploying can find many opportunities to respond to a public health emergency event as part of a team, [28] through nongovernmental organization, state teams, and federal teams (Box 55.3). Registering as part of team while deployed in the U.S. or in another country is essential to a coordinated response with volunteers who are credentialed and trained. Nurses who deploy with teams can respond to hurricanes, floods, fires, earthquakes, explosive or weapons events, epidemics or pandemics, and other types of public health events. Nurses on active duty in one of the eight uniformed services can be deployed around the globe (e.g., the 2004 Indian Ocean earthquake and tsunami) or in the U.S. when local, state, and national systems need support (e.g., Hurricanes Katrina and Rita). Nurses serve in a range of public health emergency planning and response roles, including direct patient care, incident management, and overseeing federal agency operations. One of the authors served as the Director of the Command Center at HHS after September 11, and the other author, in addition to being in a senior leadership position at HHS, was deployed as the lead for the HHS Secretary's Response Team for Hurricane Rita.

BOX 55.3 Sample of Organizations Active with Team-Based Response

Volunteer Organizations

International Rescue Committee (https://www.rescue.org/)
Project Hope (https://www.projecthope.org/);
American Red Cross (https://www.redcross.org/about-us/our-work/disaster-relief.html)

Federal Teams

Disaster Medical Assistance Teams https://www.phe.gov/Preparedness/responders/ndms/ndms-teams/Pages/dmat.aspx)
Medical Reserve Corps (https://aspr.hhs.gov/MRC/Pages/index.aspx)

Recovery

As soon as response activities are initiated, recovery operations should begin. As with preparation and response, the whole community has a role and should be engaged with planning and implementing recovery efforts to address the following areas: economic, health and human services, housing, infrastructure systems, natural, and cultural.[29]

INTERRELATED CONCEPTS

Within this text, there are several concepts related to public health emergencies as shown in Fig. 55.4 and described in the following section. During a public health emergency, large segments of a population may be affected. **Population Health** provides "*an opportunity for health care systems, agencies and organizations to work together in order to improve the health outcomes of the communities they serve.*"[30] Monitoring the health of the population during a disaster may include assessing for environmental exposures, assessing the health of displaced persons in shelters, and assessing for mental or behavioral health issues. It is an understatement to state that effective communication is critical during a disaster. **Communication** should be clear and follow established criteria and the chain of command. In the Incident Command System, a standardized approach to managing a disaster, communications are integrated into the system.[18] Communications can be challenging if there is a lack of interoperability between communication systems (e.g., radios, satellite phones) and a 24-hour news cycle and social media. Interdisciplinary **Collaboration** is a foundation of public health emergency response. Large-scale disasters often involve emergency management, law enforcement, fire response, emergency medical systems, healthcare systems, public health systems, businesses, religious-based organizations, and nongovernment organizations. Productive collaboration requires that everyone know their roles, the command structure and chain of command, and how to operate within the system. **Ethics** and ethical decision making can be different during a disaster, especially a large-scale disaster when the focus may be on saving the greatest number of people. As one example, during the initial phases of the COVID-19 pandemic, hospitals were overwhelmed with patients who needed care that could not be provided to the usual standards of care. New Mexico was one of the states that declared, through a public health order, that the state was enacting their crisis standards-of-care procedures.[31] The public health order permitted crisis standards of care to be implemented and other actions to help address the medical surge of patients who needed care. Populations at risk and those who have experienced **Health Disparities and Health Equity** are oftentimes more affected by disasters.[32] In all phases of public health emergencies, efforts need to be undertaken to ensure that at-risk populations are engaged in the planning, response, and recovery planning and efforts. Nurses can advocate and facilitate this engagement. Participation in the **Health Policy** process is an opportunity to address issues and challenges identified during a disaster. After each disaster, information should be collected, in an after-action report, about what worked well and what needed to be strengthened to better respond in the future. Systemic issues can often be addressed through changes in health policy.

CLINICAL EXEMPLARS

There are many examples of public health emergencies and aspects of response. Box 55.4 presents some of the most common situations or examples seen in clinical practice. It is beyond the scope of this text to provide details for all exemplars, but some of the most important are featured next.

Featured Exemplars

Mass Vaccination

Mass vaccination plans are designed to vaccinate all eligible and willing people in an area. If there are not enough personnel to trace and vaccinate all contacts quickly enough, public health authorities may choose to implement community-wide, or

BOX 55.4 EXEMPLARS OF PUBLIC HEALTH EMERGENCY

- Mass vaccination
- Surge capacity
- Crisis standards of care
- Response to a public health emergency
- Triage
- Health assessments in shelters
- Direct patient care
- Personal protective equipment

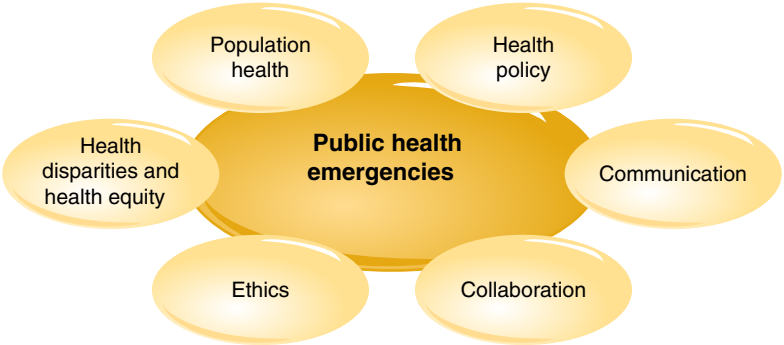


Fig. 55.4 Public Health Emergencies and Interrelated Concepts.

mass, vaccination campaigns. Mass vaccination efforts include screening vaccinees for contraindications, assessing vaccinees for which vaccine they should receive (if different vaccines are available), administering the vaccine, and educating the vaccinee on proper vaccination site care.

Surge Capacity

Medical surge capacity refers to the ability to evaluate and care for a markedly increased volume of patients—one that challenges or exceeds normal operating capacity. The surge requirements may extend beyond direct patient care to include such tasks as epidemiologic investigations. For example, during the initial phases of the COVID-19 epidemic, hospitals and acute care facilities were overwhelmed with patients presenting with symptoms, including shortness of breath. Sometimes during a surge, triage facilities need to be established outside of a facility to protect the integrity of the facility to continue providing services and to manage the large numbers of patients presenting for care. This is accomplished by working with local public health, medical, and incident command personnel to establish surge facilities (tents or vacant buildings) and hospitals in the early phases of the COVID-19 pandemic.

Crisis Standards of Care

What used to be unimaginable in the U.S., implementing crisis standards of care, was implemented in states across the country as health systems experienced large surges of COVID-19 patients and issues with supplies (e.g., personal protective equipment), life-saving equipment, and workforce shortages. In an acute care setting, patients may be transferred to patient loads across facilities in a geographic area; clinical experts should be used to assist with clinical decision making and help ensure consistency; intensive treatments may need to be administered regionally and criteria established for use (extracorporeal membrane oxygenation [ECMO]); and critical workforce personnel—nurses and respiratory therapists—should work to the full extent of their scope of practice and clinical leadership, in collaboration with others, to create a fair process for use of clinical therapies and vaccines.[33]

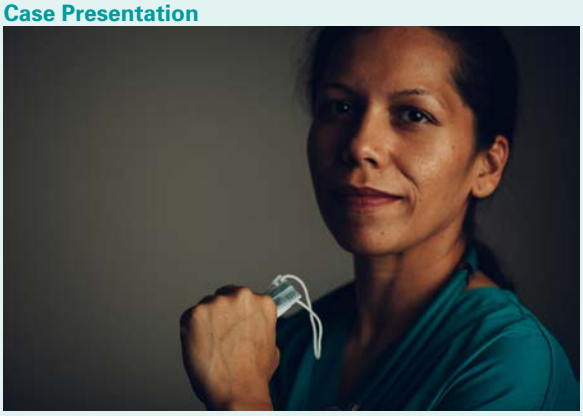
Response to a Natural Disaster

A response to a natural disaster depends on the type and extent of the disaster. Responders may be activated to assist at the scene or in a shelter housing those who have been displaced. As part of a team, everyone has a designated role. Licensed nurses will have more opportunity for providing direct patient care and prelicensure students may be able to provide some care under supervision or assist with logistics or operations as part of the Incident Command Structure.

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

CASE STUDY

Case Presentation



Carmen Espinosa is an emergency department nurse with 12 years of experience. While working triage on the night shift, a 60-year-old female presents with fever or chills, cough, shortness of breath, fatigue, and a loss of smell for 2 days. Carmen elicits the following history: Three days ago, the patient attended a retirement lunch for a colleague who had recently returned from international travel. Her friend was not feeling well but attributed her symptoms to jet lag, and she really did not want to miss her own retirement party. She admits to experiencing increased difficulty breathing, and Carmen observes shortness of breath during the interview.

Carmen recalled hearing something on the news about cases of respiratory illnesses in China and Europe caused by an unknown virus. The reported symptoms include shortness of breath, fever, gastrointestinal symptoms, with respiratory decompensation in people with concurrent chronic diseases. Carmen recognizes the potential for this patient to decompensate and also recognizes the risk of infection transmission, so she immediately takes measures to minimize the risk of exposures and address the patient's urgent medical condition.

Case Analysis Questions

1. What does Carmen need to consider with respect to a potential infectious agent spread by respiratory fluids?
2. What immediate steps should Carmen take to protect herself and limit the spread of the disease?
3. Where should Carmen place the patient and what should she share with the primary care provider in the Emergency Department?

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CONCEPT 56

Spheres of Practice

Jean Foret Giddens

Over the course of two decades, there has been an unquestionable shift in healthcare delivery on many levels, including healthcare finance, health policies, scope of practice for nurses, where healthcare is delivered, and emphasis of healthcare. Historically the context of healthcare was primarily focused on injury and disease management and traditionally was delivered in hospital settings. Subsequently, a hospital-centric healthcare delivery system shaped healthcare education (including nursing) that emphasized acute hospital-based care, particularly clinical education.

With the recognition that the traditional healthcare model is inefficient and does not address the actual healthcare needs of the population, changes have been occurring. Health promotion and wellness has always been encouraged, but the financial rewards associated with treating the sick and injured has made substantive change slow and challenging. Today, healthcare is viewed from a broader perspective to reflect the needs of individuals and populations and includes a variety of practice areas beyond the traditional inpatient, hospital-focus. The purpose of this concept presentation is to highlight the spheres of healthcare practice and the interface of nursing practice within these spheres.

DEFINITION

Spheres of practice is probably best described as an emerging concept. For this reason, there is a limited body of literature so titled, although there are volumes of literature that support the need for thinking about healthcare and nursing practice within the context of Spheres of Practice. Such literature proposes the idea of these spheres along with the emergence of new models of health care. These ideas are closely aligned with many contemporary topics such as value-based care, wellness, medical homes, person-centered care, care coordination, transitions, teamwork, collaboration, and interprofessional practice.

As a starting point, it might be helpful to clarify what is meant by a sphere. A common mental image of a sphere is a globe-like geometric object that is essentially a three-dimensional circle. Many common physical objects fit this perspective including a ball, a marble, or even a grapefruit. However, in a more abstract context, a *sphere* also refers to "an area of activity, interest, or expertise; a section of society or an aspect of life distinguished and unified by a particular characteristic."[1] Another similar definition is "an area or range over or within which someone or something acts, exists, or has influence or significance."[2]

The two preceding definitions serve as a bridge to clarify the term *spheres* in the context of healthcare. In other words, it is understood that a sphere represents an area or interest within healthcare practice. The American Association of Colleges of Nursing (AACN)[3] specifically uses the term *spheres* in the context of healthcare by describing the care and services required to address healthcare needs of individuals, families, and populations and to promote desired health outcomes as *spheres of care*.

For purposes of this concept presentation, a *sphere of practice* refers to *an area of practice that corresponds to and meets the healthcare needs of segments of the population.* In other words, it is the type of care provided to a segment of population based on need. It is important to clarify that the spheres of practice are not bound by location, but rather a focus of care that can be delivered in a variety of settings. This point will become clearer throughout this concept presentation.

SCOPE

The changing landscape of healthcare provides an important backdrop to understanding the scope of Spheres of Practice as a concept. As shown in Fig. 56.1, Lipstein and colleagues[4] describe four primary categories representing the health status of broad population segments and the corresponding reasons people seek healthcare. These categories logically translate into the spheres of professional nursing practice and inform us of the current and future areas nurses will need to be prepared to practice.

Health and Wellness

The largest segment of healthcare need by the general population fits into the *health and wellness* sphere. This represents individuals who are generally healthy; their reasons to access healthcare generally fall into measures that promote health and wellness and intermittent need for care for minor illness or injury. Those who seek care for maternity and prenatal services,

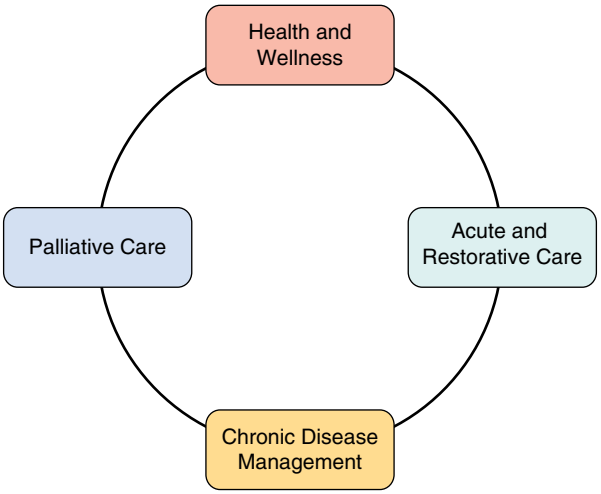

Fig. 56.1 Scope of Concept: Spheres of Care. The scope of this concept is represented by four categories (spheres) of practice.

those who seek vaccinations and screening examinations or procedures, and those who seek care for minor, uncomplicated illnesses or conditions, and minor injuries fall into this category. Although this represents the largest segment of the population, this sphere is associated with the least healthcare expenditures.[5]

Acute and Restorative Care

Many individuals, at some point in their lives, experience an unexpected serious health event, major episode of an illness, or serious injury that requires a higher level of care than does a minor illness and injury. A very small segment of the population requires this type of care at any given point in time.[4] This sphere represents the initial treatment for the acute phase of the illness or injury and the restorative phase (rehabilitation) needed as part of the recovery trajectory. Examples of conditions or situations requiring acute and restorative care include (but are not limited to) acute myocardial infarction, stroke, acute heart failure, respiratory failure, sepsis, complex surgical procedures, premature birth, or traumatic injury. This segment also represents those who have an acute exacerbation of a chronic condition requiring acute, emergency care. As one example, an individual with a chronic respiratory disease could experience a sudden worsening of the condition triggering acute respiratory failure.

Many individuals who survive an acute illness or injury require a period of rehabilitation. Examples include cardiac rehabilitation after a myocardial infarction and physical rehabilitation after a stroke or traumatic injury. The majority of individuals who need acute and restorative care are hospitalized in acute care settings or are in an inpatient setting for restorative, rehabilitative treatment, although many acute care services have expanded beyond the hospital. Prehospital care and acute level care in the home already occur and will likely expand in the future.

Chronic Disease Management

Another very large segment of healthcare need by the general population is represented by the *chronic disease management* sphere. People who seek care within this category have one or more chronic health conditions that require ongoing chronic disease management. Many people have complex multimorbid conditions. In 2018, nearly 52% of the noninstitutionalized US adult population had at least one of these ten chronic conditions—arthritis, cancer, hypertension, stroke, heart disease, chronic obstructive pulmonary disease, asthma, diabetes, hepatitis, kidney disease—and half of these individuals had multiple chronic conditions.[6]

Palliative Care

As individuals approach the end of their natural lives, their care becomes highly individualized with a focus on meeting physical, psychological, emotional, social, cultural, and spiritual needs. Although older adults represent the largest population segment requiring these services, palliative care is needed across the lifespan and across the illness trajectory, regardless of the underlying health conditions. It is estimated that 75% of people approaching the end-of-life could benefit from palliative care.[7] As the population ages and the percentage of those with complex chronic conditions increases, it is predicted that there will be a greater number of people who will need for palliative care services in the future.

ATTRIBUTES AND CRITERIA

Attributes refer to conditions that always exist associated with the concept and are useful in clarifying the concept. Four criteria are associated with this concept.

Represents Population Need

The four spheres reflect how the population uses healthcare services. The largest two segments representing the largest healthcare utilization include wellness services (keeping people healthy) and chronic disease management, geared at optimizing the health of those living with a chronic condition. In fact, in 2019, 65% of the population reported having excellent or very good health compared with 10% of the population reporting fair or poor health.[5]

Advanced age is a variable strongly correlated to health complications and the need to access health services for chronic conditions. The other two spheres—*acute and restorative care* and *palliative care*—represent smaller healthcare utilization because these represent more of a situation-based need, whereas health promotion/wellness services and chronic disease management represent ongoing care needs.

Life Span and Diverse Population Groups

The spheres represent the healthcare needs of people. Regardless of one's age, race, sex, socioeconomic status, or other population metric, people across the spectrum should have access to healthcare services in each of the four spheres. However, the utilization of services in each sphere is not necessarily equally distributed. For example, the need for chronic disease management and palliative care increases with age; thus, the average age of those requiring such services is higher. Unequal distribution also occurs as a result of health disparities. Disparities exist among segments of the population seeking healthcare services because of many factors, such as a lack of access, lack of

education, lack of trust in the services offered, or doubt about need. A lack of trust was blatantly apparent when vaccinations initially became available during the COVID-19 pandemic[8] and subsequently led to population disparities among those who died or had serious illness.

Wellness–Illness Continuum

Collectively, the spheres represent the wellness and illness continuum of the general population. The large majority of the population will access healthcare for services within the wellness sphere for the majority of their lives. All individuals, even those with chronic conditions, have opportunities to promote wellness. For example, all individuals—especially those with chronic health conditions—were encouraged to get vaccinated against COVID-19 as one example of the continuum of care represented by the spheres. In fact those with chronic disease were among the highest priority groups to receive the vaccination because of their risk of needing acute care with a COVID infection.[9] Ideally, as individuals age and chronic conditions emerge, these are effectively managed with an ongoing emphasis on optimizing wellness.

Interprofessional Practice

The effective delivery of healthcare in each sphere of practice requires a well-educated and skilled workforce representing all healthcare disciplines. No single healthcare discipline can effectively address all needs within a specific segment and for all populations represented; thus, all disciplines are needed. Effective interprofessional practice requires healthcare professionals skilled and committed to collaboration in each sphere; this is necessary to maximize the health outcomes of patients. However, the mix of healthcare professionals needed in each sphere may vary. For example, the majority of health promotion and wellness services can be effectively delivered by teams of registered nurses, advanced practice nurses (such as nurse practitioner, clinical nurse specialists, and nurse midwives), pharmacists, social workers, and nutritionists. Other aspects of medical care, such as the management of complex health conditions and treatment of serious, acute illnesses and injuries will require physicians, nurses, and other providers with specialist training.

THEORETICAL LINKS

As noted earlier, a significant shift in the delivery of health care have been occurring for over a decade, with an accelerated shift from inpatient to outpatient care. Some of the reasons driving this change is the recognition that healthcare really does not meet the needs of the general population. There has also been a shift away from a fee-for service model toward value-based care models that reward healthcare providers for better outcomes and greater system efficiencies. These models have emerged to address the lack of efficiency and fiscal sustainability within health care.

Innovations challenge the status quo and provide a path to reenvision approaches. Spheres of Practice is an emerging concept fueled by efforts to develop future, innovative approaches geared at improving healthcare delivery. With this in mind, a useful theoretical framework is Healthcare Innovation.

The adoption of healthcare innovations is complex. Flessa and Huebner offer a model of healthcare innovation which depicts the complexity not only the current healthcare environment, but also the complexity regarding the successful adoption of a healthcare innovation.[10] As shown in Fig. 56.2,

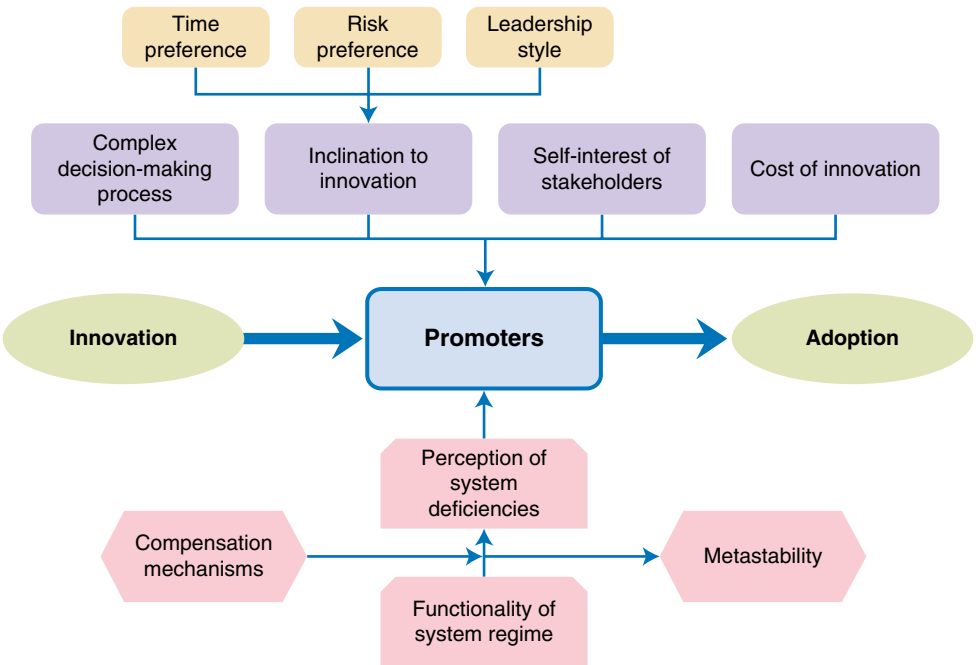

Fig. 56.2 (From: Flessa, S. & Huebner, C. (2021). Innovations in health care – A conceptual framework. *Int J. Environ Res Public Health, 18*(19), 10026. https://doi.org/10.3390/ijerph181910026.)

the model is driven by an innovation which is moderated by promoters. Promoters represent factors that are influenced by the success of change. These include both factors that contribute to a perception of system deficiencies as well as factors that reflect positive moderating variables, such as the decision-making process, the self-interest of stakeholders (particularly healthcare professionals), cost, and an organization's inclination toward innovation. It should be no surprise that improved health outcomes, cost containment, and system efficiencies are among the strongest drivers of change in new healthcare delivery models.

Healthcare innovation supports the emerging nature of Spheres of Practice. A ripple effect that will occur as this concept is further embraced is the preparation of a healthcare workforce that be responsive to the individual needs of people, with attention to their health status as organized within the spheres.[4] Innovation that supports the evolving nature of healthcare models will also contribute to the evolution of the healthcare workforce and changing roles within healthcare. Likewise, innovative healthcare providers will lead the creation of future healthcare models.[11]

CORE COMPETENCIES

Spheres of Practice

- Demonstrate an understanding of each sphere of practice and the corresponding segment of population that accesses it.
- Engage in interprofessional team-based practice as a component of the spheres of practice.
- Develop required skills associated with the spheres of practice represented within the specific healthcare setting.
- Demonstrate effective communication skills for care coordination within and across spheres of care.

CONTEXT TO NURSING AND HEALTH CARE

The spheres of practice have obvious implications to nursing and all healthcare disciplines. Particularly important components include nursing education, workforce development, healthcare economics, and the changing trends where healthcare is delivered, now and into the future.

Education and Workforce Development

Promoting and sustaining health from the perspective of the four spheres of practice has a significant effect on future workforce development for all disciplines, especially nursing. Nurses are needed to meet the needs of the population within all four spheres. Nurses should have a good understanding of all four spheres and, based on where they practice, have the skills to address the spheres associated with their area of practice. Mentioned previously, the spheres of care do not represent a setting, rather a focus of care. It is possible, in some settings, that a nurse may provide care that is linked to two different spheres. For example, a nurse working in a medical practice focused on chronic disease management may also provide services related to wellness and health promotion.

For these reasons, there is a need for intentional integration of all four spheres into the education of new nurses. AACN Essentials specifically requires that all students have clinical experiences that interface with all four spheres of care, and among individuals across the life span.[3] This will ensure that students graduating from nursing programs have at least generalist knowledge and skills in each area. Capstone experiences prior to graduation, certificate programs, attainment of a digital badge through continuing education, and graduate education represent opportunities for additional experiences and acquiring competency in one or more of the spheres.

Population Health and Health Promotion

Although there will always be a need for nurses prepared for acute care and specialty areas, emphasis for future workforce development will be focused on keeping people healthy. The skills required for this sphere of care include population health, health promotion and protection, and skills in treatment of minor illnesses and injuries.

The foundations of population health are discussed in Concept 54 in this textbook so the information will not be repeated here. The key skills needed include excellent communication skills, community assessment, and skills in assessing and addressing social determinants of health to promote health equity. There is considerable evidence that many individuals who desire and need wellness and health promotion services are unable to access care, and those reporting the greatest challenge accessing care are the underserved.[5] The delivery of effective health promotion includes knowledge and skills associated with health prevention strategies, particularly nutritional health, exercise, avoidance of smoking and substance misuse, screening examinations, health hygiene, and vaccinations. Patient education is the cornerstone of health promotion (see also Concept 51: Health Promotion).

Acute and Restorative Care

Nurses will continue to be needed for the delivery of acute and restorative care. Patients within this sphere require complex care in specific areas; thus, a nursing workforce that is highly skilled in specialty areas will be needed. The specialty focus is narrow to reflect the high skill level needed for care. For example, the skills needed for care in a perioperative unit are far different than those needed in a neonatal intensive care unit, and very different than those skills need by a flight nurse providing emergency care. The specialized skills do not translate to the broad population in the same way as those that are needed for health promotion. Even though this sphere of practice represents the healthcare needs of a small segment of the population, a large nursing workforce is required to deliver specialty care. Because of the aging nursing workforce, short-term and long-term concerns exist about maintaining a sufficient number of nurses prepared to work in these areas.

Chronic Disease Management

As noted previously, a very large segment of the population requires healthcare within the sphere of chronic disease

management. These individuals live with incurable health conditions; thus, the focus of care is the management of these conditions to maximize quality of life and life expectancy. All spheres of care are best delivered by high-functioning, integrated interprofessional teams with an emphasis on patient-centered care. This is especially important within this sphere of practice, because caring for individuals with complex chronic conditions—often complicated by social issues—requires a multidisciplinary team for complex problem solving. Team expertise in social services is particularly important. Nurses engaged in chronic disease management will develop sustained relationships with the patients and families they care for. Because many of the patients have complex, multimorbid conditions (including mental health conditions), a wide range of skills are needed by nurses and include assessment, care management, care coordination, communication skills, technology, informatics, and skills addressing social determinants of health to promote health equity. Nurses and other healthcare professionals must have intentional interprofessional education experiences to optimize preparation for team-based care.

Palliative Care

A skilled workforce of nurses is needed for the delivery of palliative and end-of-life care for individuals across the lifespan. The largest segment of population who needs such services is the older adult population, and as the population continues to age, even more individuals will need palliative care and end-of-life services in the future. Because many of these people have multiple chronic conditions and are often challenged with physical disabilities, cognitive decline, and/or fragility, the care required can be quite complex.[4] The foundations of palliative care are discussed in Concept 53 in this textbook; the key skills needed include assessment and management of symptoms, medication management, care coordination, access to resources, counseling, education—all delivered in a patient-centered approach. Palliative care is offered as a home health service within nursing homes, in assisted living facilities, and outpatient facilities. Although the science and education of palliative care has advanced significantly, number of healthcare professionals with specific training in palliative care has remained small. Consequently, palliative care and end-of-life care are often provided by clinicians who lack the specialized training.[12]

Economics

Healthcare utilization and spending is lowest with the healthiest segment of population and highest with a small percentage of population. In 2019, healthcare expenditures of the healthiest 50% of the population accounted for 3% of overall spending whereas 5% of the population accounts for nearly 50% of all healthcare expenditures.[5] Those in the top 1% of spending consumed 21% of total healthcare spending, with an average of $130,000 per year in healthcare expenses.[5]

Promoting and sustaining the health of the broader population will have significant effect on future healthcare spending. The United States Task Force for Preventive Services makes recommendations for a variety of examinations and screening tests which are typically covered by most insurance plans and cost a fraction of the expense of treating someone for an ongoing chronic condition. The cost of wellness services and the treatment of minor episodes of illness and injury is cost effective. Thus, from a healthcare economics perspective, the goal is to keep large numbers of people healthier and for longer periods of time and reducing the number and complexity of those with multimorbid chronic conditions.

Changing Trends Where Care Is Delivered

The recent changes in healthcare delivery are designed to address evolving healthcare delivery needs. Spheres of practice reflect the type of care needed across population segments, but where care is delivered is another matter. Two significant current trends that are expected to continue to evolve in future are directly related to this concept.

Perhaps the most seismic change has been, and will continue to be, the shift of healthcare delivery in the home. Among the significant drivers of this shift include the emergence of new technologies with advanced capabilities, consumer demand, and healthcare economics. One of many unexpected lessons from the COVID-19 pandemic was the relative ease by which patients could access primary care services through telehealth, with actual office visits reserved for those who could not have their needs met through telehealth technologies. The continued development of a variety of technologies has made it possible for increasingly sophisticated virtual care, such as diagnostics and remote patient monitoring.[13] Such advances can be used for care delivery in each of the four spheres presented in this concept presentation, especially for chronic disease management and palliative and end of life care. All nurses working in these areas will need to become skilled in telehealthcare delivery.

As care increasingly shifts into the home and more services are offered in alternative spaces within the community, an evolution of large, regional acute care medical centers is expected to occur. The consolidation of hospitals has been on an accelerated pace during the past decade;[14] in fact, the significant trend for healthcare mergers and acquisitions prior to the pandemic has come back in full force.[15] It was mentioned previously in this chapter that the segment of the population requiring acute care services is very small, but a large specialized workforce of physicians and nurses is needed to provide life-saving care. A benefit of regional medical centers is a clustering of services to ensure a high volume of services and procedures that lead to more consistent care and higher quality outcomes. Furthermore, such an approach will reduce the number of specialists needed to manage the population demand.[4] Currently there is duplication of many services within multiple hospitals in a geographic area and a complete lack of services in other areas; thus, the consolidation of services may help address future concerns regarding an insufficient number of nurses and physicians with specialized skills.

INTERRELATED CONCEPTS

There are multiple concepts in this book that are interrelated to the spheres of practice. **Population Health** has an emphasis on healthcare that affects large groups of individuals and addresses both wellness initiatives and public health challenges. Likewise, the concept **Public Health Emergencies** addresses situational response to situations that affect the health of the general public and often require acute care and health promotion responses. The concept **Health Promotion** is geared toward primary, secondary, and tertiary prevention measures, which correspond to the spheres of practice. Transitions of care (from acute care to chronic care management, or from chronic care management to palliative care, as examples) requires **Care Coordination** across services to ensure the needs of patients and their families is met without gaps in care. Likewise, coordinated services across all four spheres of practice requires interprofessional **Collaboration**. Healthcare providers who have an area of practice within a specific sphere must have an awareness and appreciation for the services offered in other areas for effective transitions and response to public health needs to occur. Finally, the concept **Palliative Care** is, itself, one of the spheres or practice. As noted in Concept 53, palliative care focuses on physical, psychological, social, and spiritual needs of patents and family members who face serious, life-threatening, and chronic end of life conditions. These concepts are presented in Fig. 56.3.

CLINICAL EXEMPLARS

One or more of the four spheres of practice is found in all areas where healthcare is provided. For this reason, essentially all areas of healthcare represent exemplars for at least one sphere. Although it is not possible to list every exemplar, Box 56.1 presents some of the most common under each sphere. Note that many of these are listed in more than one sphere; thus, the emphasis is not on the location of healthcare, but rather on the type of healthcare services offered.

Featured Exemplars

A discussion of all exemplars presented in Box 56.1 is beyond the scope of this concept presentation; however, a few of the most common exemplars are presented. Each includes a brief description along with an intentional link to the corresponding spheres of practice.

Emergency Departments

The primary focus of emergency departments (EDs) is to assess and stabilize those who are seriously ill or injured. This life-saving emphasis clearly aligns with the acute and restorative sphere of practice. However, 6% of ED visits end up with an admission to a hospital.[16] Many people seek care in EDs because of problems accessing healthcare services; thus, the vast majority of patients seen in EDs seek care for minor illnesses and injuries that could have been managed in traditional primary care practices, urgent-care clinics, and nurse-run clinics (which align with the health and wellness sphere).

Ambulatory and Outpatient Surgery Centers

An ambulatory or outpatient surgical center offers what is referred to as same-day surgical care; in other words, the patient is discharged home after the procedure. These centers can be a privately owned, freestanding facility or part of a hospital-owned facility. Procedures performed in an ambulatory surgical center can be diagnostic, preventative, or curative. Ambulatory surgical centers only treat patients who have been seen and

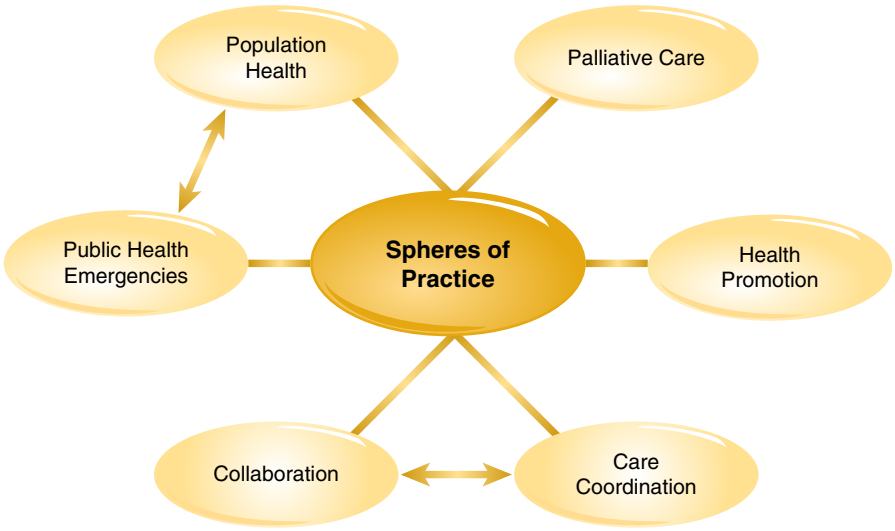

Fig. 56.3 Spheres of Care and Interrelated Concepts. Two of the spheres of practice are also concepts represented in this book: *Palliative Care* and *Health Promotion*.

BOX 56.1 EXEMPLARS OF SCOPE OF PRACTICE

Health and Wellness
- Ambulatory/outpatient surgical centers
- Ambulatory clinics
- Birthing centers
- Community-based health clinics
- Clinics affiliated with senior living communities
- Dental offices
- Employee health clinics
- Optometry services
- Outpatient imaging centers
- Public health departments
- Student health clinics
- Urgent care and retail clinics

Acute and Restorative Care
- Acute care hospitals
- Emergency departments
- Home health services
- Medical homes
- Prehospital emergency services
- Rehabilitation hospitals and clinics
- Skilled nursing homes

Chronic Disease Management
- Ambulatory clinics
- Cancer centers
- Community-based health clinics
- Dialysis clinics
- Medical practices
- Medical homes
- Skilled nursing homes
- Home health care

Palliative or End-of-Life Care
- Assisted living facilities
- Home health care
- Hospital (specialty units)
- Outpatient clinics/facilities
- Skilled nursing homes

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diagnosed by a healthcare provider who has determined that the procedure is an appropriate treatment. The most common specialty services offered in ambulatory surgical centers include ophthalmology and orthopedics.[17] Depending on the reason for and type of procedure, ambulatory surgery primarily represents the health and wellness or chronic disease management spheres of practice.

Home Health Care

Traditionally, home health services represent a variety of healthcare services for homebound individuals who need care after an illness, injury, surgery, or as health declines associated with a chronic condition. Home health requires an order written by a healthcare provider. Services offered include wound care, intravenous infusions, physical therapy, occupational therapy, social work, custodial care, education, palliative and end-of-life care, to name a few. Home health care intersects with three of the spheres of care—as restorative care, chronic disease management, and palliative/end-of-life care.

Hospitals

A hospital is an institution that is built, staffed, and equipped for the sole purpose of delivering health care, including diagnostic services and treatment of those who are sick or injured. The designation of a hospital requires that the institution have at least six beds, offer diagnostic and therapeutic patient services, be overseen by a physician staff, and provide continuous nursing services under the supervision of registered nurses.[18] Historically the primary focus of care offered by hospitals has been on the management of acute or serious conditions and injuries, thus addressing the acute and restorative sphere of care. However, most hospitals also offer ambulatory services, thus addressing the needs of individuals requiring care associated with other spheres of practice.

CASE STUDY

Case Presentation

Joseph Folker is a 80-year-old widower who has stage 2 heart failure, hypertension, type 2 diabetes, and depression. He is seen every 6 months by a physician and nurse practitioner for management of these conditions at a large community-based medical practice for chronic disease management. At a recent visit, he is told his conditions are stable and unchanged, but he had notable weight gain over the past year. He receives an annual flu vaccination and is encouraged to lose weight through dietary modification and increased activity. Subsequently he meets with a health coach to discuss dietary and activity goals to maximize his wellness.

A few months later, while shoveling snow in his driveway, Joseph experiences sudden onset of intense chest pain. While attempting to go inside he becomes dizzy, slips on the ice and falls. He is transported via emergency services to a large regional medical center and treated for acute myocardial infarction and a hip fracture. He is cared for by physicians, nurses, and many other healthcare

Continued

CASE STUDY—cont'd

professionals at the medical center. After his stay at the medical center, Joseph is transferred to a rehabilitation hospital for several weeks to undergo ongoing cardiac and orthopedic recovery. He is cared for by nurses and other health professionals focused on rehabilitative medicine.

Unfortunately, the damage to Joseph's heart was significant; his condition advanced to stage 4 heart failure which contributed to his inability to regain mobility; he was unable to walk or do any activity without excessive fatigue. Cardiac transplant was discussed with Joe and the family, but they did not feel this was a good option. Joseph and his family made the decision to enter hospice care. Joseph is transferred home under the care of a home health palliative care services team and his family. He died peacefully 4 months later, surrounded by his family.

Case Analysis Questions

1. In what segments of healthcare need (sphere of practice) is exemplified by this case.
2. How are the concept attributes reflected by this case?
3. Which concepts shown in Fig. 56.3 are relevant to this case?

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CONCEPT 57

Health Systems

Teresa Keller

Healthcare service delivery in the United States has evolved to provide a broad spectrum of care in a variety of settings to a diverse population of consumers.[1] This requires organized systems of care that include specialized units staffed by a highly educated workforce, financed by a mix of private and public funding, and subject to regulatory oversight by public and private authorities.

Health systems have multiple, interested stakeholders including consumer advocates, professional groups, elected government officials, communities, and, of course, patients and their families, all of which interact with the system. In the United States, healthcare systems are complex, embedded in an inherently fragmented healthcare services sector, and subject to continuous stressors from within the system and from without. The health systems in this country must be able to change and adapt to meet the challenges of internal and external stressors, where the goal is to reach a point where the stressors are reconciled and the system is stabilized.

The interactive and changing nature of a health system means the people who work in these systems profoundly affect the work and evolution of the system.[2] Members of these dynamic social systems can potentially develop an innovative practice, a new communication strategy, or even a new service or product that will spread and amplify across the subsystem components and to the environment beyond. The significance of this perspective of the organization is that all people involved with a health system, as members the system, make meaningful contributions to the success of the system. As members of the largest professional workforce, nurses can have a strong and positive influence on the system as it evolves and innovates.

DEFINITION

For the purposes of this concept presentation, Health System is defined as *an organization consisting of people, institutions, and resources working together to deliver health care*. A health system is dynamic, interactive, and in constant change. The term *system* is used because these organizations consist of networks of components that are interdependent and interactive, where action in one component of the system potentially affects the others. The people who work in these subsystems make decisions and take actions that serve to coordinate the work within their own subsystem and communicate and coordinate with other subsystems. The result is a system that adjusts and adapts as it absorbs information and feedback from the environment and from within its own components. For the systems perspective offered in this chapter, the concept of Health Systems is also limited to *systems of practice,* which are systems where professionals provide unique healthcare services.

A health system addresses the health needs of region, a population group, a community, or a market.[1,2] These systems are often distinguished by their mission or purpose. Federally supported health systems may deliver healthcare services to active-duty military personnel and their families. Some health systems are created to serve populations within a certain geographic area, such as county or parish hospitals, and are supported by local and state taxes. Many health systems are meant to serve a healthcare market, such as a city and surrounding suburbs, but not a specific population group. Regardless of the intended purpose, a health system consists of multiple, interacting, and interdependent components made up of people who make decisions and take actions that affect other components; therefore, the health system is dynamic and changing.

SCOPE

Health systems vary greatly in the United States, depending on their purpose and form. Some are purposely designed to meet the need for healthcare services in a community or population, whereas others have a health-related purpose but do not deliver healthcare services. For example, pharmaceutical companies develop and sell medications. Medical equipment manufacturers sell their products to health systems. Insurance companies provide financing for healthcare services but do not actually deliver care. Although these other nonservice delivery organizations are also system models, they are not systems of practice, in which individuals are cared for by professional care providers.

The variety of distinctive health systems with specific purposes defies simple classification. To establish a scope for this

complex topic, only health systems that provide a range of healthcare services for health promotion, illness, and wellness care are considered. This encompasses a variety of systems, large and small, and include, but are not limited to, national chains of hospitals, primary care clinics or ambulatory care centers, federally qualified health centers (often referred to as *FQHCs*), nursing homes, and long-term care facilities. These organizations consist of multiple interacting components that are interdependent. For example, even a small nursing home will have a nursing subsystem, a dietary subsystem, a finance and billing department, and a housekeeping staff. These subsystem components work together to produce the care services delivered in that organization. If the nursing home is part of a regional chain of organizations offering long-term care for older adults, then the nursing home system is a subsystem component of a larger health system.

ATTRIBUTES AND CRITERIA

The defining characteristics of a health system are the interacting, interdependent components that adapt and change as necessary to support the purpose of the system. As social systems, they operate in environments from which resources are obtained and from which challenges are presented that require an organizational response.[1] Health systems are distinguished from other types of organizations by four attributes: (1) their unique purpose in providing health care, (2) their specialized workforce, (3) a level of public trust earned through a common understanding that these systems exist to provide help and support to others, and (4) their interactions between internal and external environments.

Providing Health Care Services

The first attribute of a health system is that the primary purpose is to provide healthcare services. This focus distinguishes health systems from other types of systems involved in the business of health care. The primary purpose of companies that sell health insurance is to sell an insurance product. Schools for health professions have a primary education purpose. The purpose of accreditation and public regulatory agencies is to support and guide the services delivered and the quality of outcomes obtained, but they do not directly deliver healthcare services. A health system provides services that help others to manage illness or promote health, whether those services are childhood immunizations, surgical interventions, diabetes education, family planning advice, or any of a wide variety of other healthcare services offered to individuals, families, communities, and populations. This purpose remains the same, regardless of profit status or ownership arrangements.

Specialized Healthcare Workforce

Health systems are social systems because system output is dependent on people—the workers who make decisions and take action in response to internal and external forces. The work is complex, variable, and, at times, urgent in nature.[1] The margin for error is narrow with little tolerance for mistakes that can lead to life-threatening and costly consequences. These systems employ a highly specialized workforce needed to deliver their services. Health professionals who work in these systems undergo extensive education and experiential learning. The knowledge and skills of these specialized workers are necessary for the decisions needed to take effective action in an ambiguous, challenging work environment. The compelling need for this specialized workforce increases the costs for health systems, but it also benefits the organization in terms of maintaining standards and ensuring quality services.[3] An additional benefit is that the strong professional ideals of these healthcare providers promote and strengthen the service values that support the public trust placed in these organizations.

Furthermore, the work of managing the health of humans is not easily divided as people present with health problems that affect the whole person, their families, and perhaps the entire community. The need to treat a person, rather than a disease or problem, is central to the work of healthcare professionals. This creates an interdependence among these workers that is consistent with a systems model.[1] Although labor might be divided among numerous specialized personnel, the need to address the person or patient as a whole means that each of these professionals is dependent on the knowledge and skills of others. An interprofessional approach to the treatment of human health problems is a distinguishing feature of health systems, but the need to negotiate differences in an interprofessional group also drives the complexity encountered in everyday practice.

Although health systems are uniquely defined by a specialized workforce, a discussion of the healthcare workforce is not complete without reference to the numerous other personnel essential to the effective functioning of the system. For example, the human resource department of any health system is important because healthcare professionals expect to receive a salary and benefits. Dietary and housekeeping personnel provide important services that support the work of healthcare professionals as do the departments responsible for ensuring adequate supplies and equipment. The specialized, educated healthcare provider would be hard-pressed to carry out the service mission without this critical support.

Public Trust

A third attribute is that a health system has the trust of the public. This attribute links to early health-oriented organizations that were created by religious orders or by social benefit groups to provide services to society's most vulnerable members—people who are ill and infirm. The work of these early organizations gained the confidence of the public that their altruistic purpose was to serve others by providing care and comfort, regardless of personal circumstances.[4] These laudable efforts helped to establish a social contract between the public and healthcare organizations that benefit modern health systems in terms of financial rewards and public regard.

Currently, the level of public trust in health systems has eroded with the growth of managed care, national corporate chains of for-profit hospitals, and allegations of fraud and abuse by healthcare providers.[5] However, people still turn to their physicians and nurses for help and advice, and they still seek

healthcare services within these systems. This indicates that the social contract is still intact, if a little worn.

Health systems promote a positive image visible in the system's mission statement, through their public image, and by observing their contributions to their communities and stakeholders. A positive image is easily cultivated by organizations with a religious sponsor or a charitable mission. However, even those organizations that are not part of a religious organization or charitable group still value a positive public image. Health systems that provide quality healthcare services and are good corporate citizens will be able to maintain their positive image and their part of the social contract.

Internal and External Environments

Systems possess an internal environment, but they also interact with an external environment.[6] The internal environment of a health system consists of an integrated web of factors such as organizational culture (where *culture* is defined as a set of values, beliefs, and practices), subsystems such as information systems or the human resources management system, and structural elements such as role responsibilities, rules, and practices. All of these factors affect the decisions and responses of people working within the system.[2,7]

The external environment in which a system is embedded consists of external forces, conditions, or events, such as economic trends or new laws and government regulations. One example of an external environmental force that profoundly affected health systems in the United States is the COVID-19 pandemic. This external stressor placed great strain on all types of health systems, resulting in additional expenses, resource restrictions, and provider burnout.

Systems that are well integrated into their environments will also change those environments in some ways, adding to the complexity of the relationship.[2,7] For example, a national economic recession can prompt workers to expand their work hours, either by increasing the hours they work or by seeking additional employment. This holds true for nurses. If experienced professional nurses are working more hours or seeking additional employment, the nursing shortages common in health systems might temporarily resolve. If a more experienced nurse is preferentially hired into a system, a less experienced nurse or new graduate might not be hired. The decline in demand for new nurses has the potential to affect the admission decisions of nursing schools or the funding decisions made by government organizations that support nursing education.[8] As these resources are curtailed, there are fewer new nurses prepared and, subsequently, fewer new nurses to hire to replace nurses who leave or retire from the health system.

Multiple interacting forces in the healthcare environment increase uncertainty and create instability.[9] Health systems will adapt to meet the challenges presented by their environments but must continue to maintain expected standards of care.[2] An example of the internal pressures created by external environmental demands is tying government reimbursements to the use of evidence-based standards of quality care while ensuring optimal patient safety. Meeting quality and safety standards is highly desirable, but it is also costly in terms of training personnel, providing additional staffing, and building work processes that support quality care and patient safety. This creates tensions for system providers who must continue to meet expectations for safe and effective care with limited additional resources.

The need to change (rapidly in some cases) in response to environmental effects tends to create uncertainty and instability in a health system. Policies or processes designed to meet environmental challenges might conflict with professional values or with legal standards of practice, requiring negotiation and coordination among the subsystems to resolve the conflict. New technologies might need to be adopted that require a shift of resources from one part of the organization to another.[6,9] Conflict, negotiation, and coordination, plus the shifting of resources, are the internal results of external stressors, all of which ultimately lead to system adaptations and evolution.

THEORETICAL LINKS

The industrial revolution led to the development of large organizations. As these organizations grew, they became the vehicle through which different kinds of human activities are organized and coordinated. This prompted social scientists to study the phenomenon of purposive, organized systems and create theories to explain these systems. A complete description of the organizational theories of the past 100 years is beyond the scope of this concept presentation. Instead, an overview of the major directions in theory development related to organizations is useful in understanding the conceptual base for health systems.

Bureaucracy

Early conceptualizations of organizations were that they were closed systems and were a rational, machine-like collection of components to be coordinated and controlled through authoritative management.[4] Max Weber, German sociologist and economist, developed the first theoretical model of bureaucracy in the early 20th century. Weber described the principles of organization that created efficiency in work design and were thought to be the most effective way to organize work. He also described the distribution of authority in bureaucracies, noting that authority grounded in position and divided into hierarchies was preferable to authority derived from personal characteristics. Weber viewed the bureaucracy as the organizational design most likely to create the stability needed to sustain an organization.[4] Bureaucratic design was common to large organizations that developed during the industrial revolution because the manufacturing and distribution of goods required a rational system of centralized control to effectively acquire resources and efficiently convert them to a finished product. Bureaucratic organizations were made of functional parts or divisions, all welded together through management control made possible by hierarchical authority. These organizations were believed to be capable of achieving a high degree of coordinated precision in production, leading to the common metaphor of a "well-oiled machine."

The drawback to this model of rational efficiency is that it takes little account of the organization as a social system within

an environment.[4] Bureaucratic theory mainly focuses on authority and control to achieve efficient production within a closed system. The human dimension of the organization is not well defined outside of the role of management. Other organizational theorists of that time attempted to describe and explain the social dynamics of organizations, but the main theoretical approach taken was mechanical and emphasized the role of management in attaining maximal productivity from workers through planning and control. The effects of environmental factors on the production and efficiency of an organization were also not considered by these early theorists. The bureaucratic organization was a self-contained, closed system.

Systems Theory

Viewing organizations as social systems developed within the human relations school of organizational theorists. This group focused their study on the needs and desires of people who work in the organization.[4] From this field of study grew an understanding that the organization has social components that interact and that these components are affected by factors from the outside environment.[4] These social components (people, relationships, and roles) interact with environment, technology, and organizational structure in an integrated manner to create a unified, dynamic system. An open system's perspective paved the way for interesting new theories that not only intrigue organizational theorists but also provide new ways to organize and empower the people who work in these systems (Fig. 57.1).

Complex Adaptive Systems

Current organizational theory describes the organization as having biologic characteristics that allow the organization to react and change when stimulated. This understanding defines a new way of viewing organizations as organic and lifelike entities that are open to the environment and capable of transforming themselves in light of perceived opportunities and threats. Organizations can "read" and interpret the environment, and they can adjust and adapt through the coordinated action of their interdependent parts.[1,2] The changes that occur within an organization in response to environmental stimuli are necessary for sustaining the organization just as metabolic processes within the human body change to allow the body to adapt to environmental challenges. In the case of the health system, the need for change and adaptation requires that all organizational members be engaged and motivated to meet the organization's goals. Viewing the organization as a living social system recognizes the creative energy of the people who innovate to produce desirable products and services in uncertain, changing environments. Understanding the health system as a complex, adaptive system is probably the most realistic of the organizational theories developed to date because it can account for the complexity created by interrelated and interdependent social systems responding to internal and external stimuli.[2]

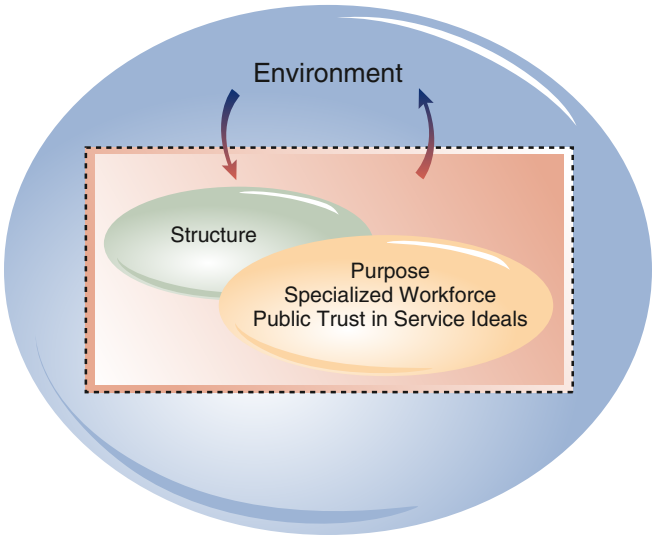

Fig. 57.1 Health Systems: Open Systems Model.

CORE COMPETENCIES

Health Systems

- Recognize internal and external system processes and structures with the potential to delay or prevent safe care.
- Describe and analyze how information and feedback is communicated across system-subcomponents.
- Participate in system-wide initiatives that improve care delivery and/or outcomes.
- Represent the interests of practice professions in organizational strategic planning.
- Advocate for patients and patient-centered care in strategic decision-making throughout the system.

CONTEXT TO NURSING AND HEALTH CARE

In the context of health care, health systems can be broadly classified by their mission, financial structure, and ownership.

Mission

The purpose of a healthcare system is determined by the organization's mission, vision, and values.[6,10] Mission statements describe each organization's purpose based on a vision of what the system is meant to achieve. Mission statements also describe the values that drive the work of the organization, such as quality and excellence. Even if the health system is a for-profit, privately owned corporation that pays dividends to shareholders, the mission statement will reflect values commonly associated with health care such as service and professionalism. Because mission statements reflect strategic vision, they focus and drive the work produced toward organizational goals. Mission statements that reflect values and primarily benefit shareholders, such as seeking higher profits, would drive the work of the health system in a direction that may conflict with the goal of helping others with their healthcare needs. Mission statements that prominently feature service ideals and values and promote assistance and support to others are more consistent with ethics of most healthcare professions.

Financial Structure

Another way to classify health systems is by their financial purpose, as either for-profit or not-for-profit entities. The difference between the not-for-profit and the for-profit system is not the profits generated but, rather, how the profits are distributed. For-profit systems (many national, shareholder-owned hospital chains) are designed to generate profits for shareholders while also providing healthcare services. Not-for-profit systems (most healthcare systems owned by religious organizations and most government-owned hospitals and health centers) also generate profits, but these are used for organizational purposes, such as building additional facilities, providing expanded or improved services, or acquiring new equipment.[10]

In reality, this distinction between for-profit and not-for-profit health systems is less clear because all organizations must pay attention to financial viability. The need to generate revenues to meet expenses is important to all organizations, whether for-profit or not-for-profit, because the failure to cover expenses creates risks to the continued existence of health systems. Unprofitable health systems that collect less revenue than what is required to meet expenses—even if they are publicly supported—will eventually have to close or be reorganized.

Ownership

In addition to their mission and financing, health systems can also be classified as publicly or privately owned. Publicly owned health systems are organizations that are supported by government funding. The typical example of this type of ownership is the tax-supported county or state hospital that provides generalized healthcare services or specific health services, such as behavioral and mental health. State and local public health departments could also be considered publicly owned health systems. Investor-owned corporations are considered privately owned, but private ownership could also include health systems owned by religious or social organizations.[10,11]

The defining characteristics of mission, finance, and ownership noted previously can be combined to create a myriad of health systems designed to meet the challenges of the healthcare environment. One example could be hospice services. Hospice services provide specialty care to a specific population—people who are terminally ill and their families. As a health system, the hospice might be for-profit and privately owned (by investors) and any profits generated by services are returned to the investors in the form of dividends, or the hospice might be not-for-profit and privately owned by a religious organization and any profits realized are returned to the health system to improve the quality of services and infrastructure or to sustain other services offered by the organization. Both for-profit or nonprofit programs provide the same unique service and play a distinct role in the healthcare community,[1] although they vary by ownership and profit status. Furthermore, a hospice could be a part of an integrated, national network of health systems delivering a full spectrum of coordinated healthcare services. Regardless of the structure and institutional arrangement, as a form of health system, the hospice must be ready to manage costs and maintain services while evolving as the health services environment changes.

Regardless of the mission, financing, or ownership, nurses are found in almost any kind of health system, where they are responsible for ensuring the safe and effective delivery of care. The nursing profession in the United States is the largest health professional group. Nurses work throughout the health services sector and in all health systems because their knowledge and skills are integral to the delivery of healthcare services.

However, nursing contributions to successful health systems go beyond providing bedside, patient-focused care. Nursing contributions include active management and administration of patient care and patient units, conducting research, and collaborating with other professionals to coordinate and deliver safe and effective patient care. Nurses work as case managers, infection control specialists, managers of information technology, human resources specialists, and quality/risk managers. Nurses are also directors and executives, advanced practice providers, and administrative specialists in health systems and health system networks. Furthermore, professional nurses affect the environments of health systems by creating partnerships with other institutions, educating future nurses in universities and community colleges, and working with public policy decision makers to create policies that enhance health services environments. It is likely that professional nurses will be associated in some way with health systems for most, if not all, of their professional nursing careers.

INTERRELATED CONCEPTS

Other organizational concepts featured in this textbook are important to understand the health system as a dynamic social system (Fig. 57.2).

Contemporary **Leadership** is required for health systems—a leadership that creates inspiration, is able to sustain motivation to achieve results, and values the contributions of all members. Leaders must be able to "read" the environment and interpret the trends or changes for others. They must be able to lead others through turbulent and uncertain environments and must be able to adapt to change as readily as their followers.[12]

Timely, current, and accurate **Communication** is an essential component of safe and effective care delivery.[12] Delayed, diminished, or compromised communication not only hampers the organization's activities and productivity but also can lead to serious deficiencies in patient care. Ineffective communication is linked to many instances of catastrophic errors in patient care, such as wrong-site surgery or unexpected patient death.

Collaboration can be defined as partnerships developed for the purpose of achieving optimal patient care outcomes.[13] It is essential that nurses be able to collaborate with other members of the healthcare team, the patient, and the patient's family to deliver quality health care that is safe and effective. The ability to collaborate also creates the conditions necessary for effective mentoring of new nurses and for professional control of practice.

Technology and Informatics is essential to the health system for ensuring the delivery of safe patient care, and the collection and meaningful use of patient care information provides the basis for much of the evidence used in healthcare decision making. The era of the electronic health record has arrived and is proving to be a disruptive innovation that will fundamentally

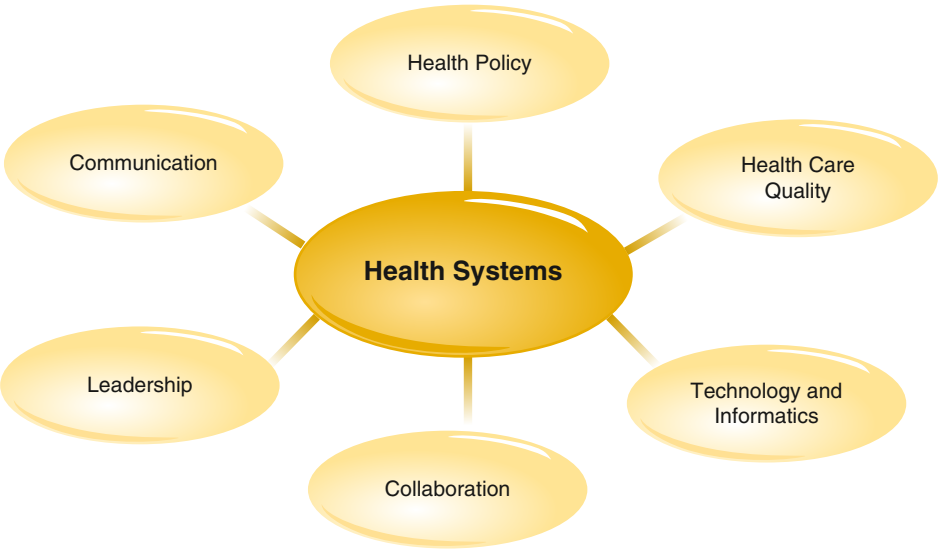

Fig. 57.2 Health Systems and Interrelated Concepts.

change how health care is delivered. Clinical informatics provides data and statistics about healthcare services and the outcomes of these services.[14] Coupled with new government payment systems, these outcomes will drive the products and services provided by health systems.

Most health systems today prioritize a focus on **Health Care Quality**. Healthcare organizations and healthcare leaders (including nurses) have worked to identify gaps in care that lead to patient care errors and to propose solutions to address the conditions that lead to these errors. Many of these proposals are aimed at correcting the problems in organizational design and function that promote an error-prone environment in health systems. For instance, the strategies developed for improving communications in handoffs are meant to promote greater patient safety during transfers between units

Health Policy is a major force driving change in health systems. Obvious pressures are changes to health system revenues related to an increased focus on reimbursements for quality outcomes or on changes to health insurance markets that result in greater access to health care. Less obvious are the pressures that arise from other policy decisions. To illustrate, consider the effect of decisions by a state board of nursing on the nursing workforce. Suppose a board of nursing moves to require a bachelor's degree as a condition of professional licensure. A decision such as this will affect the staffing patterns of health systems and salaries of the nursing staff.

CLINICAL EXEMPLARS

Over the course of their professional careers, nurses might work in a wide variety of health systems. As defined previously, a health system can be any type of organization developed for the delivery of healthcare services and employing a workforce of health professionals to achieve this mission. These include hospitals, clinics and ambulatory care centers, nursing homes, public/community health agencies, hospice, and health systems developed to meet the needs of a unique market or population (Box 57.1). These are the more familiar types of health systems in which nurses are likely to be employed. These facilities may be classified by ownership, financial purpose, and services delivered, but when combined with their organizational mission and purpose, the variety of health system structures expands greatly. In addition to working in different types of health systems, nurses might move between different subsystems within the larger system or even move from one hospital in a large system to another hospital in the same system. It is common that a nurse will move from one nursing unit to another that is different specialty focus.

BOX 57.1 EXEMPLARS OF HEALTH SYSTEMS

Hospitals
- Teaching/academic medical centers
- Community hospitals (rural and urban)
- Specialized care (rehabilitation)
- Large regional or national networks (chains) of interrelated healthcare systems

Nursing Homes
- Independent living
- Assisted living
- Skilled nursing care
- Memory care
- Long-term care

Clinics and Ambulatory Care Facilities
- Federally qualified health centers
- Nurse-managed centers
- Urgent care services
- Ambulatory care clinics
- Same day surgical centers

Specialty Healthcare Systems
- U.S. Department of Defense
- U.S. Department of Veterans Affairs
- U.S. Indian Health Services

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Although nursing is a subsystem within a larger health system, nursing care services is also made up of subsystems within the nursing system. Medical–surgical units vary from obstetric units, and both of these vary from emergency services department. However, the subsystems within nursing are connected by a common nursing workforce with a common set of practice policies and procedures. They interact with each other in addition to the interdependencies and interactions that nursing units have with other subsystems outside of nursing. The actions and decisions made in one unit potentially affects any other nursing unit with which they interact.

Featured Exemplars

Hospitals

Hospitals have traditionally been viewed as tertiary care centers for the treatment of acute illness and disability. Hospitals can be large or small and urban or rural, but they are all driven by a particular mission. For example, research and teaching hospitals are large health systems usually associated with academic health centers whose mission includes the education of health professionals and the delivery of healthcare services. Community hospitals offer general medical and surgical services to a surrounding community, but most will not have a research or teaching mission. Hospitals can also specialize in the care of a particular health condition, a market, or a population.

Clinics and Ambulatory Care Centers

Clinics and ambulatory care centers are health systems with a mission to deliver services in an outpatient setting. Many of these entities will have subsystems such as nursing, pharmacy, laboratories, and patient education units. For example, federally qualified health centers offer primary care services such as well-child examinations, immunizations, and the diagnosis and management of chronic conditions such as diabetes. Patients served in these centers receive medical and nursing care, prescription drugs, vaccinations, and routine laboratory testing. Another example of an ambulatory care health system is a nurse-managed center offering a range of primary care services for adults, children, and families. Clinic facilities and ambulatory care centers do not provide prolonged acute care, so patients requiring these types of services are referred to a hospital for treatment, often within the same health system.

Nursing Homes

Nursing homes and assisted living facilities offer long-term, skilled nursing services most often to the frail and ill elderly population. However, adults with conditions that require prolonged periods of skilled nursing care may also be admitted to a skilled nursing facility. Nursing homes and skilled nursing facilities are often subsystems within a larger, integrated health system that includes acute care hospitals, rehabilitation facilities, and long-term acute care. In these large, integrated systems a patient might move from an acute-care hospital to a rehabilitation hospital, and then to a skilled nursing facility to finish their treatment. In these systems, the nurse is often in charge of coordinating and assuring that a patient moves safely through a care pathway that includes all these subsystems.

Specialty Healthcare Systems

Other health systems with highly specialized purposes include those of the U.S. Department of Defense that provide healthcare services to military members and their families. Another example would be Indian Health Services, providing healthcare services for Native American populations. These systems most often confine service delivery to the specified population and are designed with the unique needs of these populations in mind. For example, the health systems that make up the network of the U.S. Department of Veteran Affairs facilities offer services only to U.S. military veterans. In these health systems, nurses play an important role in assuring the delivery of safe and effective care across all the subsystems.

CASE STUDY

Case Presentation

A form of health system that offers nurses the opportunity to fully realize their professional role is the Magnet organization. Magnet organizations are primarily hospitals that have system components and processes that promote excellence in nursing practice. The health system that adopts Magnet principles is committing to an organizational design and structure that empowers nursing staff to achieve higher levels of performance through engagement and participation. The Magnet designation is only obtained after a process of learning and self-evaluation followed by changes to the organization's structure.[15] These design changes provide a decentralized authority structure created to support participative management and professional autonomy for nurses. Nurses working in Magnet facilities expect to be active participants in organizational processes, to govern themselves, collaborate with other professional colleagues, and be both responsible and accountable for the outcomes of nursing care.

Magnet designation is an empowerment model that captures the main features of the complex adaptive system. Adopting Magnet principles meant to attract and retain excellent nurses is, fundamentally, the recognition that professional nursing is a valuable and scarce resource essential to the effective function of the system.[15] Nurses are not simply workers in the system but are instead a critical subsystem within the larger health system that makes substantial contributions to the organization's success. To achieve this recognition, a health system must be able to demonstrate the full integration of professional nursing into its operations

Continued

CASE STUDY—CONT'D

through authority structures that move decision making, power, and control of practice to the nursing staff. This is usually accomplished through the creation of governance councils in which all nursing staff are able to voice their concerns with care issues and then make decisions that will affect how care is delivered in that facility. Professional decision making is no longer the exclusive domain of the nursing executive and directors. Instead, there is a flattening of hierarchical relationships related to authority and control over practice, with more of the responsibilities for care outcomes assumed by nursing staff.

The health system must also demonstrate that appropriate processes are in place that allow for the development of innovative care strategies and that nurses can implement and review the results of their innovation efforts. Quality management in Magnet organizations is robust, and nurses are fully involved in creative activities that encourage continuous quality improvement and the achievement of excellence in nursing care. These facilities promote the continuing professional development of their nurses by supporting education and career-ladder programs.[15]

Case Analysis Questions

1. Which major and minor attributes of health systems are represented in this case study?
2. Consider the interrelated concepts shown in Fig. 57.2. Suggest how each interrelated subsystem that represents the concept is affected by nursing empowerment within the health system.

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CONCEPT 58

Health Care Economics

Teresa Keller

Most people in the United States finance their health care through some form of insurance, either through their employers or government or military programs or through out-of-pocket payment.[1] The healthcare market is complicated and involves insurance companies, employers, a variety of government agencies, and institutional stakeholders. The result is a fragmented system of health insurance coverage that profoundly affects access, equity, and quality of care within the health services sector. Even with the major overhaul of the healthcare insurance market by the Patient Protection and Affordable Care Act of 2010 (Public Law 11-148), commonly known as the *ACA*, gaps in coverage still exist and there are still issues with access to quality, affordable care for all.[1,2] Determination of those who qualify for access to healthcare markets, the amount of care received, and how to pay for it are some of the moral and practical challenges to financing health care for all.

Economics is a social science that studies how valuable and scarce resources are distributed in human social systems. In the United States, demand for health care exceeds the available supply, meaning those goods and services are considered both valuable and scarce. Economic theory and principles, when applied to the financing and delivery of healthcare services, provide insight into the issues of the distribution of scarce or limited healthcare resources.[1] The fundamental problem of resource scarcity requires making choices in the healthcare market about the allocation of these resources. Healthcare economics is concerned with both efficiency (getting the most out of a fixed amount of resources) and distribution (determining who receives resources and who will be denied).[3]

DEFINITION

Healthcare economics focuses on resource distribution. For the purpose of this concept presentation, Health Care Economics is defined as *the study of supply and demand of resources and their effect on the allocation of healthcare resources in an economic system.*[3,4] The term *healthcare finance* refers to the arrangements made to pay for these goods and services.

SCOPE

The scope of this concept includes the availability (or scarcity) of healthcare resources, access to these resources, and the financing or payment mechanisms to pay for these resources (Fig. 58.1).[1] Whether or not there is payment influences utilization of resources, regardless of the availability and distribution of health care. Therefore, healthcare economics and finance are two sides of the same coin and are appropriately considered together. The delivery and financing of healthcare resources is highly influenced by the actions of government, as well as public and private organizations, because these entities define and control payment for healthcare services. Individual responses to price-cost and supply-demand signals in a healthcare market (behavioral economics) are also within the scope of this concept.[4]

ATTRIBUTES AND CRITERIA

The attributes commonly associated with the concept of Health Care Economics are markets, price and cost, supply and demand, and efficiency versus equity in the production and distribution of healthcare goods and services. In a healthcare market, financing is driven by these attributes and their effect on the behavior of market participants. Each will be considered separately for the purpose of identifying and understanding each attribute. However, each of these pairs of attributes has effects on the others, resulting in complex interactions (Fig. 58.2).

FIG. 58.1 Scope of Concept: Health Care Economics.

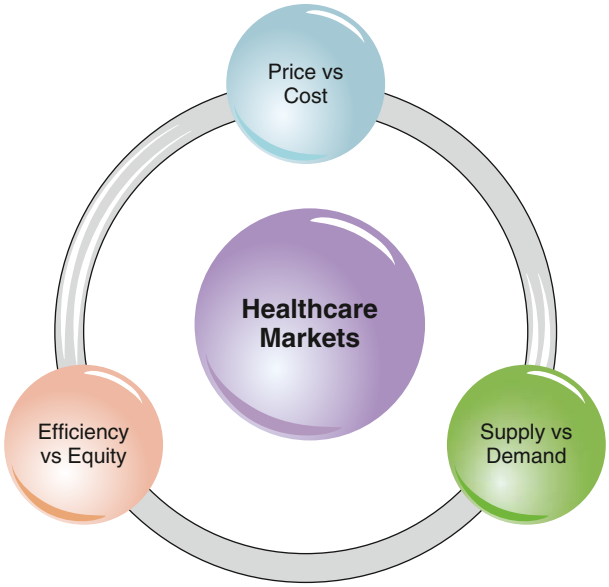

FIG. 58.2 Relationship Among Attributes of Healthcare Economics.

Markets

In traditional economic theory, the exchange of goods and services is thought to take place in a competitive market. In this market, buyers and sellers have full knowledge of the goods and services offered, prices are determined by the perception of value by both sides, and every participant can enter or exit at will.[1,3] Prices stabilize when neither participant in the exchange will receive additional benefits from changes to the price. The basic assumption of this model is that it operates free from outside influence and without producing undue burden for participants.[1,4] This assumption does not hold true for healthcare markets in the United States.

Many factors distort the processes that drive healthcare markets. Entry into the market is often limited to those individuals who are insured or able to pay the expected price for goods and services.[3] Knowledge of conditions in the market that affect financing is often limited to producers, governments, insurers, and professional healthcare providers, whereas buyers and consumers often have less knowledge of these conditions.[4] Insurance coverage shields healthcare consumers from the true cost of health care; therefore, their decision to buy is distorted. Government intervention in healthcare markets always distorts the relationship between price and costs, further complicating individual decision making and affecting producer costs and the price paid by buyers.[3]

Price and Cost

The price of a good or service is a combination of the seller's production costs plus an additional increment that represents the seller's profit. In a market, price settles at the level of acceptance by both the seller and the buyer, an equilibrium point where neither side will derive more benefit from a price change.[3,4] In healthcare markets, price is highly influenced by factors unrelated to this basic exchange between participants.

For example, consider the cost and price of a cough syrup. Most healthcare consumers know little about pharmaceuticals, increasing the risk that a consumer could experience harm from taking too much of a given medication. In an effort to protect healthcare consumers, a government regulatory agency determines that the particular formulation of cough syrup must only be sold with a provider prescription. Limited access created by government decree means the supply of cough syrup is available only for those purchasers who obtain a prescription. As the supply of cough syrup is limited and assuming demand does not change, the price of the medication increases, and the producer's profit is enhanced. Requiring a prescription for cough syrup creates additional costs for the consumer because they now must visit a provider for an exam and prescription, perhaps taking time from their work schedule or adding to their childcare costs. The consumer ends up paying for the producer's costs and profit margin plus additional costs related to government-mandated restricted access.[3]

Supply and Demand

In a market, the unit price for a particular good or service is negotiated through the many interactions between buyer and seller until it settles at a point where quantity demanded by consumers will equal the quantity supplied by producers at a price acceptable to both. This results in an economic equilibrium between quantity desired and quantity supplied.[3,4] Two important relationships will determine the price of goods and services at equilibrium. Increasing demand will result in driving up the price of a good because the supply does not meet the demand for that product. The production of that item will increase as producers seek to maximize their profits by selling to meet rising demand. The price point will stabilize where supply meets demand.[4]

In healthcare markets, the relationship between supply and demand is often distorted and price equilibrium is not easily achieved.[3,4] In the cough syrup example, limiting access to cough syrup will reduce demand because the buyer must also assume additional costs to obtain a prescription for cough syrup. Adding a pharmacy to the transaction as a middleman also increases the costs for consumers and may lead to a decrease in demand, not because of the relationship between demand and supply, but because the middleman adds their costs to the price of a product. Some buyers will be priced out of the market by the additional costs. Some producers may decide to exit the marketplace, thereby limiting choice for the consumer and affecting the supply of cough syrup even more.

Efficiency and Equity

Efficiency in the production and distribution of healthcare resources can be thought of as either avoiding waste (including waste of equipment, supplies, and people) or as using healthcare resources to get the best value for the money. Equity is assuring that everyone will have access to the healthcare resources they need and that these goods and services do not vary in quantity or quality among different individuals.[3]

Efficiency and equity are another pair of intertwined concepts as the economic question is how to balance both. Efficient production assumes a trade-off between quality and costs that could lead to very expensive or low-quality products. Efficient

distribution could result in limited access or the provision of less-than-optimal amounts of a resource.[3,4] Suppose the makers of cough syrup find that the price for a key ingredient in their medication has increased. To maintain their profits, they could decide to substitute a cheaper ingredient of lower quality. When this new formulation is sold, the cheaper ingredient leads to respiratory distress for a subset of buyers. In this case, maintaining efficiency in the production process results in additional healthcare resources needed to treat the buyers for a medication effect that likely would not happen if the ingredients of the cough syrup had not changed. Additional costs and wastage might also accrue to the producers if they must refund the money spent by consumers on their product and recall unsold quantities of the cough syrup.

Inequities in the cough syrup market may result when pursuing efficient distribution of a product.[5] The producers of cough syrup determine that their best profits are derived when their medication is sold in medium to large cities and that their costs increase when delivering their product to rural areas. To maintain their profits and continue production, the makers of cough syrup may elect to forgo delivery of their product to clinics and drugstores in towns with less than 25,000 people. The end result is unequal access to cough syrup for people who live in small towns and rural areas.

THEORETICAL LINKS

An important theoretical link to the concept of Health Care Economics is risk. Risk is the uncertainty and unpredictability of a loss (e.g., the loss of a home because of fire). Typical healthcare risks are generally related to the debilitating effects of serious health conditions and their effect on an individual's or family's quality of life. For example, if the health of one of the income earners in a household deteriorates, there is likely to be a loss of income to sustain the family. Health insurance mediates this risk by providing the financing necessary to pay for needed healthcare resources.[3–5]

CORE COMPETENCIES

Health Care Economics

- Describe the connection between quality care and cost-effective care.
- Identify and evaluate nursing practices that affect the cost of patient care.
- Identify and examine costs of care that might be hidden in other cost charges.
- Demonstrate strategies in direct care bedside practice that minimize waste and excessive costs.

CONTEXT TO NURSING AND HEALTH CARE

Healthcare economics and finance affect all areas in which nurses practice, the individual nurse, and his or her family. Nurses delivering patient care in an organization may be unaware of the many issues of economics and finance that they encounter on a daily basis. Nurses will often learn of the economic and finance issues that directly affect their patients at discharge, such as insufficient resources to pay out-of-pocket costs or to purchase medications. Nurses will experience almost daily a constant concern for achieving efficiencies in practice, reducing unnecessary waste, and working together to reduce the costs of care. In addition, as healthcare consumers themselves, nurses will have to make choices and trade-offs about the resources they use to keep themselves and their families healthy.

Patient Protection and Affordable Care Act of 2010 (Public Law 11-148)

The ACA profoundly influences healthcare economics and finance as well as the nursing practice environment in the United States. The goal of the ACA was to reform health insurance markets in the United States. Changes from reform included provisions to expand access to health care for most of the U.S. population, abolish some insurance practices that limit enrollment in insurance plans, and address the need for promoting quality, cost-effective care in the U.S. health services sector.[3]

Access

The ACA expanded access by subsidizing state Medicaid expansions, requiring mandatory purchase of health insurance by individuals, and by creating state level exchanges where individuals and small firms could purchase health insurance.[3,6]

Insurance Reforms

The ACA eliminated two insurance industry practices that are meant to limit industry costs but also resulted in limiting access for the chronically ill. The first, *cherry-picking,* is the selection of the healthiest individuals for enrollment in a health insurance program. The second, *limitations or even denial of coverage for preexisting conditions,* is meant to exclude high-cost individuals from a given pool of insured individuals.[1,6]

These practices have been used for many years prior to the ACA to control the risk of higher healthcare costs for insurance companies.[5] After the implementation of the ACA, there was an initial uptick in expenditures from enrollment growth as more previously uninsured individuals obtained and used health insurance.[2] The duration of time that people with preexisting conditions were uninsured dropped, and the provisions of the ACA that included mandates for employer and individual purchases of insurance helped more Americans obtain health insurance in just the first year of state exchange operations. As of January 2022, the number of first-time enrollees is up significantly relative to prior years. All told, the ACA has resulted in a record number of individuals being able to obtain health insurance in the United States.[7,8]

Quality, Cost-Effective Care

Current health policy initiatives to reduce market distortions are directed at both supply and demand. *Value-based purchasing* or *pay for performance* is a financial strategy meant to encourage the efficient delivery of high-quality goods and services.[9] It is designed to enhance efficiency through better coordination of care among patients, providers, and clinicians, including nurses. Incentives are offered in the form of additional reimbursement to clinicians and hospitals for the provision of appropriate and high-quality healthcare services.[10,11]

Nursing contributions to the delivery of high-quality, high-value care enhance the organization's performance outcomes and help to optimize reimbursements from government and private payers. Many of the measures of quality tied to reimbursement are nurse-sensitive indicators. Currently, Medicare will not cover the cost of preventable hospital-acquired conditions, mistakes, and infections that can occur during a patient's hospitalization.

For example, if a patient admitted to a hospital develops a pressure ulcer during his or her hospital stay, Medicare will not pay for the costs associated with treating the pressure ulcer. Other nurse-sensitive indicators included in Medicare quality measures are falls from bed, catheter-associated urinary tract infections, blood incompatibility mistakes, and vascular catheter-associated infections. Hospitals must be able to document certain conditions as "present on admission" to avoid a reduction in the payment needed to treat these conditions. This is an additional financial burden as nurses need additional time to assess and document these conditions on admission and throughout the hospital stay. Therefore, staff nurses have a profound effect on an organization's efforts to achieve pay-for-performance standards, including education, documentation, team collaboration, and patterns of care.

INTERRELATED CONCEPTS

Several concepts featured in this textbook have a relationship with the concepts of healthcare economics and finance. **Health Policy** is used to provide overarching goals and to set priorities and values for the allocation of health resources. **Health Care Quality** is concerned with issues related to ensuring standards of care, and outcomes are achieved in the delivery of health care. **Health Care Systems** provide the framework for the delivery of health care. **Care Coordination** involves the marshaling of personnel and other resources needed to carry out all required patient care activities. **Health Care Law** affects healthcare economics because it governs the insurance industry and is illustrated in the application of healthcare funding and reform. These interrelationships are depicted in Fig. 58.3.

CLINICAL EXEMPLARS

The ability to deliver patient care is affected by a wide variety of factors related to healthcare economics and finance. These include financial strategies that distort healthcare markets, such as government regulations and public and private insurers. In addition, healthcare financing, which includes government-sponsored care, managed care, and private insurance, is a driving force for healthcare economics. Payment mechanisms dictate the use of care, and this influences the availability and scarcity of resources. These exemplars are shown in Box 58.1 and are further described.

Featured Exemplars

Medicaid

Medicaid is the nation's major public health insurance program for low-income Americans. Enacted in 1965, Medicaid has improved access to health care for low-income individuals, financed innovations in healthcare delivery, and functioned as the nation's primary source of long-term care financing. Medicaid is funded by state and federal government resources. The expansion of Medicaid by the ACA resulted in increased access to healthcare resources for those individuals and families whose income did not meet the Medicaid threshold for enrollment.[1]

BOX 58.1 EXEMPLARS OF HEALTH CARE ECONOMICS

- Medicare
- Medicaid
- State Children's Health Insurance Program
- Private insurance plans
- Accountable care organizations
- Managed care organizations

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

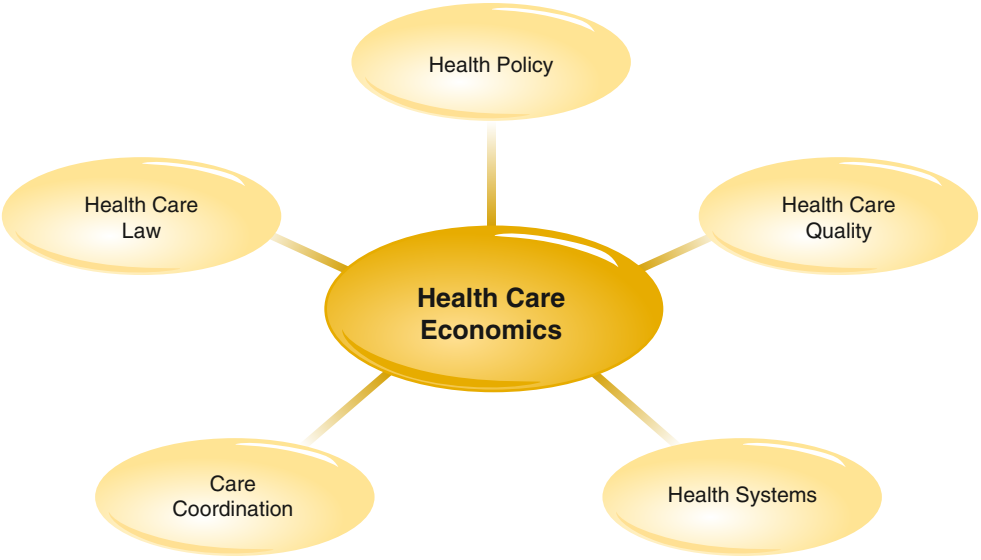

FIG. 58.3 Health Care Economics and Interrelated Concepts.

State Children's Health Insurance Program

The State Children's Health Insurance Program (SCHIP) was enacted in 1997 to provide coverage to uninsured low-income children who did not qualify for Medicaid. Like Medicaid, SCHIP is jointly funded by state and federal governments and eligibility is determined by income and need.[3]

Medicare

Medicare provides healthcare coverage for all people ages 65 years or older, people who are permanently disabled, and individuals with end-stage renal disease. It is a federal health insurance program that individuals or their spouses have paid into through employment or self-employment taxes.[9] Medicare includes hospital insurance (Part A), supplemental medical insurance (Part B), Medicare Advantage plans (Part C), and outpatient prescription drug coverage (Part D). Part A includes hospital coverage, and Part B includes outpatient coverage and is optional—the recipient must contribute a premium each month to preserve coverage. Patients with Part A may opt to add Part B, which covers 80% of the fees for outpatient services.[9]

Accountable Care Organizations

Accountable care organizations (ACOs) are organizations of healthcare providers that are accountable for the quality, cost, and overall care of Medicare patients, for whom they provide the bulk of primary care services.[9] ACOs must have defined processes for promoting evidence-based medicine and reporting data to evaluate the quality, cost, and coordination of care. ACOs that meet specified quality standards will receive a share of the savings if Medicare's cost for the care of their assigned patients is below a certain benchmark.[9,11]

Managed Care Organizations

In managed care, healthcare providers and insurance companies share the financial responsibility for health care. Patients pay a monthly premium for healthcare insurance and are able to choose from several different plans under the managed care system, including preferred provider organizations (PPOs) and health maintenance organizations (HMOs). Patients receive health care from a list of providers who participate in the PPO or HMO.[4] The price for healthcare goods and services are set beforehand by the insurance company. Providers may suffer losses if their costs for providing care exceed the payment received.[4,9]

Private or Indemnity Health Insurance

Private health insurance may be purchased on a group basis (e.g., by a business to cover its employees) or by individual consumers. Most Americans with private health insurance receive it through an employer-sponsored program.[2,9] The ACA has expanded access to Medicaid and private insurance markets for individuals and families who were previously unable to obtain insurance benefits from their employer.

CASE STUDY

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Case Presentation

Raymond Wiley operates a small business in a rural area. In his community, there is a 10-bed hospital that has a two-bed intensive care unit (ICU). A large hospital with comprehensive services is located in a nearby city 100 miles away. The Wiley family obtains their health insurance through their state healthcare marketplace exchange.

In March 2020, Mr. Wiley became ill with fever and cough. Because his regular physician was out of town, he went to the local hospital, where he was diagnosed with pneumonia and admitted. Mr. Wiley received supportive care, but after 4 days with no apparent improvement, the admitting physician transferred him to the city hospital for a referral with a pulmonologist.

Up to this point, Mr. Wiley had received routine intravenous antibiotics and fluids but did not require intensive ventilatory care. Mr. and Mrs. Wiley wanted to drive to the city hospital in their private vehicle because their insurance would not cover an emergency transport under these circumstances. Their rationale was, because Mrs. Wiley could drive, Mr. Wiley was stable, and their insurance did not cover ambulance transport unless it was a medical emergency, it was cost-effective to drive themselves. The Wiley family's request to drive themselves was denied by his providers, who explained that his diagnosis was still uncertain, and the better option was to be accompanied by emergency services personnel. Mr. Wiley was transported by ambulance and charged $1800 for that transport service.

Once Mr. Wiley arrived at the city hospital, it took 2 days for the pulmonologist to see him because the admitting unit mixed up his name with another patient. Radiography studies revealed adult respiratory distress syndrome secondary to infection with COVID-19. Mr. Wiley grew progressively sicker, eventually requiring intubation and treatment with convalescent plasma. He was discharged to a long-term acute care hospital on high-flow oxygen at 40 liters/minute after 43 days in the ICU. He was discharged to home after he was successfully weaned to 4 liters of oxygen by nasal cannula.

Case Analysis Questions

1. Recall the attributes of healthcare economics and finance. How are these attributes reflected in this case study?
2. Two hospitals are the settings for this story. Describe the efficiency versus equity issues of each.
3. How did inefficiencies and gaps in coverage affect the costs of care for Mr. and Mrs. Wiley and the costs of care for each hospital?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 59

Health Policy

Julie Marfell, Alicia Anne Farlese, and Sheila Melander

A policy is an intentional expression of decisions and actions to achieve an outcome. Policies can apply to governments, nongovernmental entities, populations, and individuals. Health policy is essential to defining vision, direction, and strategies for ensuring the safety, well-being, and health of a population. It consists of laws, regulations, decisions, and plans of action for identifying and addressing priority health issues and improving a population's health outcomes. These outcomes include areas beyond the boundaries of "traditional" healthcare delivery systems and include addressing social determinants of health and how the health of all people affects society.[1]

Widespread ill health threatens entire communities and even larger social systems, potentially disrupting the delicate web of social obligations and activities that are the supporting infrastructure of modern life.[2] The creation of public policies that address health concerns has become an accepted responsibility for governments and a means for ensuring some level of security from the personal and public consequences of ill health. The COVID-19 pandemic has reminded us that health policy at all levels of governance remains a crucial component in protecting the health and well-being of all nations.[3] The pandemic has illuminated global health disparities and inequities at a national level for many countries, including the United States. The inequities have been noted by location, race, and age.[4] These factors influence the social determinants of health which has moved to the forefront in the discussion of health equity.

In the United States, decisions about health policy are made at various government levels and by a variety of political institutions.[5] Health policy is determined through laws, regulatory actions, judicial decisions, and administrative actions of government agencies.[6] Health policy decision making in the United States is also affected by numerous health, cultural, and social trends that arise from public health emergencies, technological change, shifting demographics, economic pressures, and consumer demands.[7] The results are health policies that support a decentralized health services sector in which there is no single source of decision-making power. The healthcare policies created within this dynamic environment are meant to address goals through a political process of negotiation and compromise, subjected to public review and comment and, ultimately, acceptable to the widest possible majority of interested parties. However, the outcome of widespread, decentralized health policy decision making can also be that the policies are fragmented, complex, contradictory, and potentially unconstitutional.

This slow and sometimes cumbersome process reflects the realities of the healthcare environment in the United States. A mix of private and public systems, the healthcare environment is constantly changing and creating new opportunities for innovations that are both a part of and in response to the political and cultural values. It is also this type of health policy environment that provides opportunities for nurses to intervene in the interests of patients, patients' families, vulnerable populations, and the nursing profession.

This concept presentation will largely focus on the role that federal and state governments have in authorizing, requiring, and funding health policies that affect populations while acknowledging that many local and nongovernmental entities establish and implement health-related policies to address these larger requirements and/or needs in their areas of influence and responsibilities. To effectively participate and advocate in the health policy decision-making process, nurses should have a clear understanding of the concept of Health Policy, including its definition, major characteristics, and the ways in which it is differentiated from related concepts.

DEFINITION

A clear definition of health policy needs to account for the variety of ways that health policy is determined and controlled in the public sector. Health policy can be generally defined as a form of public policy, differentiating it from other kinds of decision making. A classic and basic definition of public policy is what governments decide to do or not to do.[8] Public policy can also be defined as the choices made by a society or by social entities that relate to public goals and priorities and as the choices made for allocating resources to those goals and priorities.[9] Health policy would, therefore, be the result of choices and resource allocation decisions made to support health-related access, goals, and priorities. A realistic definition of health policy

is *goal-directed decision making about health that is the result of an authorized, public decision-making process.* Health policy is further defined as *those actions, nonactions, directions, and/or guidance related to health that are decided by governments or other authorized entities.*

Examples of health policy include decisions related to federal subsidies for the education of health professionals, state regulations that cover insurance benefits, and court decisions that can overturn these same state regulations based on constitutional arguments. This definition also includes a variety of other health policies related to the Centers for Medicare & Medicaid Services (CMS), the delivery of care (e.g., telehealth), and reimbursements to nurse practitioners, state-mandated immunizations for school children, and the decisions of a state or federal court that establish the rights of families to make healthcare decisions for their children or elderly parents. A definition also can provide for government *inaction,* as is the case when a legislative committee defers a decision on a health-related matter or when a proposed health program is not adopted by a government agency because of resource restraints. All of these examples demonstrate the public, goal-oriented, and authoritative nature of health policy decision making. They are also examples of the divided nature of health policy decision making in the United States.

SCOPE

Health policy as a concept can first be considered within the realm of public decision making by political authority, including executive order, legislation, and judicial process or regulatory rule-making agencies. Health policy determined through a presidential executive order or by legislation is easily recognizable as the legitimate responsibility of elected leadership. Health policy decisions that is the result of regulatory actions or results from the administrative decisions of government agencies are at times not as visible or publicized and require a more intentional effort to stay informed and actively participate in the process. The decisions made in all of these policy arenas can have significant effects on the priorities, funding, distribution, and quality of healthcare services.

The scope of health policy is wide and is as varied as the numerous entities responsible for decisions, funding, enactment, and oversight and as the many populations and individuals who are affected by these decisions. Health policy decisions can have both macrolevel (e.g., CMS program funding) and microlevel effects (copayments for episodes of care) and can be made on the basis of economics, social justice, political trends, public health emergencies, and/or changing social values. Health policy can also be the source of much political conflict because it has the potential to affect a large number of people, depending on the health policy goal.

Because health policy is the result of authoritative, public decision making, a simple way to categorize it is to use the major types of political institutions established in the United States for making policy decisions. These major government institutions decide, implement, and regulate policies, including health policy, and are legally authorized to do so by constitutional arrangements. Each of these authorities uses a public process for decision making. The major public authorities operating at the federal, state, and local levels are (1) state and national legislatures; (2) state, national, and local courts and judiciary; (3) the executive branches of federal and state governments; and (4) regulatory agencies.[10]

Legislatures

The U.S. Congress and state legislatures are deliberative bodies that establish laws to serve some policy goal. Along with the authority to create laws, legislatures are also tasked with determining the appropriate funding for a legislative act and providing oversight for policies that are administered by government agencies. Health policy that results from law is legally binding as long as it is consistent with the authorizing constitutional framework.[11] The multiple perspectives embodied by the independently elected legislative representatives ensure the consideration of a diversity of different values in the political process.

Courts and Judiciary

Health policy is the result of the political integration of society's needs. The enactment of new health laws can result in the establishment of new rights related to health programs or benefits. At the same time, it might be necessary to ensure preservation of previously established rights. Court systems play an important role in the development of health policy because federal and state courts are often the staging ground for determining rights in health policy disputes. Judiciary review can be addressed to widely varying concerns, including challenging government actions, supporting the establishment of newly created rights through legislation, and ensuring protections provided by healthcare law.[12]

Executive Branch

The executive branch of federal and state governments is responsible for the execution of laws passed by legislatures. Government executives, such as state governors and the U.S. president, oversee a vast apparatus of agencies and personnel tasked with creating regulations and implementing policies and programs that reflect the intent and authorities provided by these laws. The President of the United States plays a major leadership role in health policy because of the legitimate powers of the office such as setting health policy goals, the federal budget priorities and funding amounts, and legislative veto authority.

Regulatory Agencies

Regulatory agencies either can be a part of the executive branch or may be independent or semi-independent organizations. These agencies are established by legislatures to implement and enforce laws through a rule-making process.[13] The rules developed by these agencies are made through public administrative processes and have the force of law. Health care is a highly regulated industry, so many health policies are established through administrative rule making by regulatory agencies. Decisions related to nursing licensure by state boards of nursing are an example of administrative rule making at the state level.

ATTRIBUTES AND CRITERIA

Health policies relate to a health concern or issue and are meant to address a public and/or population health goal. Health policies result from a public decision-making process that directs the action or inaction of governments.

Major attributes of health policy include

- Decisions are made by authorized government institutions such as legislatures or courts or by government-authorized entities (i.e., state boards of nursing).
- The decision-making process is subject to public review and public input.
- Health policies address a public policy goal.

Minor attributes of health policy include

- Health policies are subject to ongoing review by governing institutions and by the public.
- Health policy goals change according to changes in political and social values, trends, and attitudes and in response to society's needs (e.g., public health emergencies and pandemics).

THEORETICAL LINKS

The attributes described previously provide one means for understanding the concept of health policy. The concept can be further understood by developing an understanding of the process by which health policy is made. Anderson provides a simple framework for understanding how health policy is created through sequential stages of activities, as shown in Fig. 59.1.[14] In the first step or stage, *agenda setting*, a health-related issue is identified, usually as a problem. Nurses can be especially effective in this stage by helping to frame the issue. Framing the issue means creating a particular perspective for the issue, for example, that assisted suicide is ethically justified because patients have a right to make their own healthcare decisions. In this case a controversial issue is framed as an ethical concern.

Once defined and framed, an issue is further refined through a political process that involves negotiation, debate, and the mobilization of support from interested politicians and stakeholder groups. The next stage is *policy formulation,* in which different policy interventions are proposed and considered. *Policy adoption* is the next stage; during this stage, a proposed intervention is selected. Selection is followed by *policy implementation* (carrying out the proposed intervention), and the process ends with *policy evaluation* or determining whether the policy achieved the desired policy goals.

This simple process model does not fully describe the complexities of health policy, but it does provide a structure for clarifying the concept. As defined previously, health policies result from political processes. A basic understanding of health policy is impossible without the consideration of key political concepts that affect policy development and implementation in the United States. These concepts are basic to the operations of constitutionally grounded governments in the United States and are necessary for ensuring health policies that account for the myriad of perspectives present in a multicultural, democratic society. These include the dynamics of intergovernmental relationships, social expectations created by a system of participative governance, and effect of dominant cultural values on political processes.

Intergovernmental Relationships

The United States consists of 50 sovereign states and a federal government, united by a mutually agreed-upon constitution. The U.S. Constitution provides for a division of power between the federal government and the states that seek to balance one against the other. The result is divided and limited government powers that create the need for political collaboration through systems of intergovernmental relations. The concept of *federalism* explains the dynamics of these intergovernmental relationships. Since 1965, with the passage of Medicare and Medicaid Act, federal funding for health policy initiatives has increased significantly. Policy initiatives requiring collaborative federal-state relations may result in state governments ceding some of their decision-making authorities in return for federal funding. The reverse can also be true: The federal government may delegate more decision-making responsibilities regarding health policies to state governments.

This results in a complex mix of collaborative strategies supported by a web of shared responsibilities between state and federal governments.[15] The effect on health policy can be profound, leading to ongoing policy changes as authority and discretionary power shift. For example, the Patient Protection and Affordable Care Act of 2010 made significant changes to health insurance markets that are traditionally regulated by state governments as part of constitutional divisions of authority.[16]

Participative Governance

State and federal constitutions also help governments operate through consent of the governed. Government power, especially in the United States, is limited to that allowed by the governed U.S. citizens. Representatives of the governed are elected

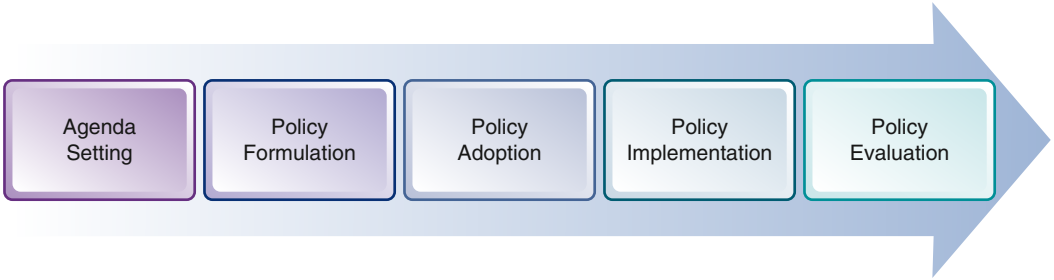

Fig. 59.1 The Policy Process.

through a public voting process to conduct the business of government and to be accountable to voters for their decisions. Citizens are also expected to attend to the actions of government and participate in the political process. Paying attention and participating include a range of activities, from the simple act of voting in elections and providing public comment on proposed policies to more active political participation such as lobbying or running for office. Participative governance is fundamental to American democratic institutions because government powers are limited and subject to the will of the governed. It is a necessary check on government power that promotes the interests and values of the citizenry rather than those of a few elected officials. Health policies created by governments that do not gain support from the governed do not enjoy much prolonged success.

Values

The dynamic relationship between the levels of government and sustained participative governance provides for the negotiation of diverse values through the political process. All health policy in the United States should be viewed as a product of negotiated values. Fairness and efficiency are the two competing values that are at the heart of most public policy decisions.[17] These values are decision drivers, and the source of much health policy conflict because decision makers must be accountable for the prudent use of public funding while also considering the needs of different constituencies. The values of fairness and efficiency are subject to interpretation and highly influenced by time, social trends, cultural expectations, economic priorities, and political situations. To ensure fairness in health policy might mean that legal rights are preserved, whether an individual right or communal rights established by law. Fairness might be interpreted as equitable distribution of health resources or as improved access to those resources. Establishing a fair policy might mean a trade-off with efficiency. Less efficient health policies may be more impartial, but they are also more costly. The additional costs must be balanced against the benefits to be derived from the policy. American democratic institutions are uniquely crafted to provide the forums necessary to manage diverse interests in open, clearly identified political processes.

Dynamic Tension

Federalism, participative governance, and the need to negotiate values produce a dynamic tension between competing health policy interests at the intersection of access, cost, and quality (Fig. 59.2). For example, providing access to care for uninsured Americans requires increased government expenditures and increases the need for tax revenue. Depending on state and national policy goals, increasing access to health care for the uninsured brings into play the forces of federalism, politics, and economic interests from both public and private sectors. Current national concerns with the quality of health care are another major focus of U.S. health policy since the publication of two Institute of Medicine (IOM) reports that emphasized the morbidity and mortality caused by medical errors.[18,19] An analysis in 2016 called for better reporting of deaths by medical error and suggested that "if medical error was a disease, it would rank as the third leading cause of death in the US."[20] Better reporting could lead to improving designs for safer systems.

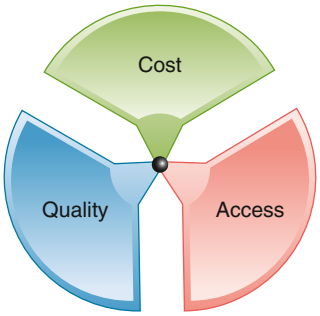

Fig. 59.2 The Dynamic Tension Among Cost, Quality, and Access.

The pandemic has raised the level of awareness of health inequities related to systemic structural racism, health disparities, and unmet social needs. These factors contribute to poor health. Strategies to address these elements of health inequity include establishing cross-sectoral agency collaboration at the federal and state levels to address these issues. These include work to expand health insurance coverage, leverage value-based payment to provide sustainable solutions that directly address social needs. Processes must be improved in the usage of data to automatically identify and qualify individuals for programs. Communities that contain historically marginalized populations need to be part of policy planning and implementation of new policies and programs. Health equity and the elimination of structural racism must be supported to eliminate health, economic, and social inequities. Policies that affect social determinants of health must also be evaluated to create change to address factors that create social marginalization and poor health. Recommendations need to prioritize federal, state, and local government to elevate community expertise, accurate data representation, ensure healthcare access, and prioritize equity in all policies and practices.[21]

To address the issues of quality care while also managing costs, the federal government has implemented several quality payment and shared savings programs through the CMS. These programs provide incentives for quality outcomes while reducing reimbursements to providers for poor-quality outcomes. Improving access to quality care while decreasing overall costs also creates tensions among a variety of interested parties, including state and federal governments, regulatory agencies, legislatures, professional provider organizations, and advocacy groups.

CORE COMPETENCIES

Health Policy

- Use healthcare data and metrics to advise in policy recommendations.
- Implement policies that protect healthcare consumers.
- Advocate for policies that promote health and wellness for individuals and communities.
- Advocate for policies that promote social justice and health equity.
- Advocate for policies that allow nurses to practice at the level of their education and training

CONTEXT TO NURSING AND HEALTH CARE

Healthcare Delivery

Health policy, as defined previously, is the result of authoritative, public decision making and is negotiated through a political process. The potential is always present that some interests will be disadvantaged compared with other interests because of the competition of ideas and values of the American political process. Because health policies, especially at the national level, have the potential to affect large portions of the public, an awareness of social policy, institutional policy, and markets is central to understanding health policy.

Social Policy

Social policy, in its broadest sense, relates to decisions that promote the welfare of the public.[22] Social policy can be directed at a wide variety of social concerns and issues in which the primary policy goal is not necessarily health, but the policy still has an effect on health. For example, government policies related to a social policy goal that addresses obesity may result in legislation or regulation that governs the sale of high-fat/high-sugar content foods available in public schools. A state or federal law might govern WIC (women, infants, and children) payments for healthy foods at farmers' markets. A linked health policy goal would be directed at ensuring CMS payments for exercise and weight loss programs.

Institutional Policy

Institutional policies govern the workplace and are often constructed in response to legislative and/or regulatory requirements. Nurses are often familiar with the policy and procedure manual of their unit, clinic or home health agency. An organization might have specific institutional policies developed for their workforce that relate to the prevention of obesity, such as providing exercise facilities onsite. Nurses also work with institutional policies that govern nursing practice, such as professional job descriptions. Social policies can take the form of organizational position statements established by professional organizations and advocacy groups. For example, the Student Nurses Association might adopt a resolution supporting exercise classes for student nurses or supporting suicide prevention training for all nurses and students.

Markets

The U.S. healthcare system is situated within an economic system that emphasizes capitalism and markets. In capitalism, markets function to ensure efficient distribution of resources to those goods and services that are the most desirable among many options. A major assumption of market systems is that the exchange of goods and services takes place among knowledgeable participants in a transparent and equitable process. This ideal is not always present in the sophisticated and expensive U.S. healthcare markets. Most Americans are dependent on the expertise of healthcare professionals to help them manage serious health problems. If they also lack adequate health insurance, they might have limited access to necessary health services if they cannot afford to pay for their care on their own. Payment is not typically negotiated between the healthcare provider and the patient; this is done by private and/or government health insurance. Payment is established by the insurers that determine the market prices.[23]

Market ideals in these circumstances break down as the pursuit of efficient resource allocation results in resources being directed away from important social needs. An example is overallocating healthcare resources to relatively lucrative health markets such as cardiovascular care in the hospital but limiting resources for childhood immunizations. This creates a need for government interventions to direct resources to goods and services that serve some public interest, provide for equity in market transactions, or subsidize care for vulnerable or neglected populations. In the complex U.S. healthcare system, the marriage of governments and markets is inevitable as policy goals shift between the twin values of efficiency and equity.[23]

Professional Nursing Practice

Within the framework of professional nursing practice, nurses are affected by a variety of policies that establish, regulate, and change their roles within the healthcare systems of the United States. These policies are the result of professional actions that define nursing roles, establish legal nursing authority over practice, and compel nurses to speak out and act on behalf of their patients and their profession.

Scope and Standards of Professional Nursing Practice

The licensing and regulation of health professionals, including nurses, are the responsibility of state governments. States create laws that establish professional practice acts meant to regulate health professionals. A state regulatory agency and a politically appointed board of nursing are tasked with the implementation and administration of nurse practice acts, including issuing licenses to individuals to legally practice nursing. Some state regulatory boards are specifically created for nursing and some boards are tasked with regulation of several healthcare professions, but all of these regulatory boards establish the scope of legally licensed practice and minimum standards for professional performance under that license. Regulatory boards have authority delegated by the state legislature to make rules, and these rules have the force of law. Professional practice errors that violate the provisions of the practice act are subject to disciplinary action by boards and are adjudicated by the regulatory agency through established disciplinary procedures. Boards have the authority to revoke licenses for unsafe practice as defined by the practice act, including actions or behaviors by the nurse that lie outside of the scope and standards of practice established by the license.

The regulatory environment for advanced practice registered nurses (APRNs) highlights the policy and regulatory jurisdictions of the state and federal government. APRNs are licensed by the state, and therefore, rules related to their practice are determined by the state legislature. For example, prescriptive authority is variable across states.[24]

Negligence and Malpractice

Related to professional licensing are health policies that govern professional negligence or malpractice. Professional negligence occurs when the actions of the nurse are judged as substandard to what is expected in "reasonable and prudent" standard of practice and that result in harm to others. Whether a nurse is in violation of these standards is dependent on the minimum standards for practice set by the relevant state board of nursing, by practice standards published by professional societies and by standards established through similar cases decided in state courts.

Engagement and Advocacy

Nurses have a profound influence on health policy by becoming engaged in the political process and through their actions in everyday practice. Lipsky introduced the concept of "street-level bureaucracy" to define the effect of frontline workers on public policy.[25] He demonstrated that these front-line workers, such as police officers and social workers, have great influence in implementing policy at the "street level," or where the policy meets its intended beneficiaries. Street-level decision making translates *policy intent* to *policy as experienced.* Nurses work very closely with patients and families who are the intended recipients and beneficiaries of health policies; therefore, nurses are "street-level" workers who have the potential to greatly affect the implementation of policy at the bedside and in the community. Nurses deal with policy issues daily while ensuring the confidentiality of patient information, allocating healthcare resources through staffing assignments, or teaching patients about their healthcare rights and how to be actively engaged in their health and care. All these actions have health policy effects for patients and their families that can be traced back to formal decision-making process. In addition, the clinical expertise of nurses can be used to influence policy at local, state, national, and international levels. Nurses are always engaged in health policy at many different levels, whether as frontline workers, patient advocates, or as policy advocates in the regulatory, legislative, judicial, and executive arenas.

Health policies and related economic consequences are everyday realities for most nurses, regardless of their specialties or their workplace. Access to care is a national health policy issue that is driven, in part, by economics. Americans with health insurance can access available healthcare resources with relative ease. Uninsured Americans either do not seek care or obtain care through federal and state-sponsored clinical facilities or in the nation's emergency departments. The lack of secured access to primary care or to needed tertiary care results in a chaotic and costly healthcare system in which financial incentives drive health behavior and health outcomes. Nurses encounter a variety of patient dilemmas caused by health status, SDOH, and economic factors in their daily practice. These situations can be the source of frustration and moral distress for many professional nurses, although they can also be the motivation for nurses to engage in political processes that produce health policies. At the height of the COVID-19 pandemic, these dilemmas were experienced daily. Stress and uncertainty caused many nurses to leave their positions and the profession. The mental health and well-being of nurses must be a constant consideration for nursing and healthcare leaders.

Nurses are in a unique and pivotal position to affect the cost/quality/access equation through advocacy. This advocacy has evolved through a series of reports and recommendations. A 2010 report published by the Institute of Medicine provided a road map for nurses to become active in health policy at the local, state, and national levels.[26] The report called on all health professionals, regulatory bodies, and policymakers to improve health care by removing scope of practice barriers and increasing education, leadership, and standardized workforce data collection and analysis. The subsequent report, *Future of Nursing 2020–2030 Charting a Path to Achieve Health Equity*,[27] advocates for improving the health and well-being of the nation with a focus on how the nursing workforce must be grown to meet the current needs with a focus on right sizing the specialties, and the distribution of the workforce to address health equity (Box 59.1). This includes addressing scope of practice that would allow all nurses to practice at the full extent

BOX 59.1 Nine Recommendations From the *Future of Nursing 2020–2030*

1. Develop a shared agenda for addressing social determinant of health and achieving health equity.
2. Initiate substantive action to enable the nursing workforce to address social determinants of health and health equity more comprehensively, regardless of practice setting.
3. Initiate the implementation of structures, systems and evidenced based intervention to promote nurses' health and well-being.
4. Enable nurses to practice to the full extent of their education and training by removing barriers that prevent them from more fully addressing social needs and social determinant of health and improving healthcare access, quality, and value.
5. Establish sustainable and flexible payment mechanisms to support nurses in both healthcare and public health in addressing social needs, social determinants of health, and health equity.
6. Incorporate nursing expertise in designing, generating, analyzing, and applying data to support initiatives focused on social determinants of health and health equity using diverse digital platforms, artificial intelligence and other innovative technologies
7. Ensure that nurses are prepared to address social determinants of health and achieve health equity.
8. Enable nurses to address inequities within communities, federal agencies, and other key stakeholders…should strengthen and protect the nursing workforce during the response to such public health emergencies as the COVID-19 pandemic and natural disasters, including those related to climate change.
9. Develop and support a research agenda and evidence base describing the impact of nursing interventions, including multisector collaboration, on social determinants of health, environmental health, health equity and nurses' health and well-being.

From: The National Academies of Sciences, Engineering and Medicine. (2021). *The future of nursing 2020–2030 charting a path to achieve health equity.* Washington, DC: National Academy of Medicine, The National Academies Press.

of their education and training. The report[27] also addresses the importance of payment for services that support nursing via education and practice to improve population health and advance health equity.

Nurses at every level and across all settings must advocate for funding and policy changes that address the need for more nurses, a diversified workforce and the ability to practice at the level of their education and training. This needs to be done at the state and federal level. The scope of practice for nurses is regulated at the state level, whereas funding is both a state and federal issue. To advocate for changes in policy it is important to understand how these issues are governed to advocate and work with representatives in both the state and federal house of representatives and senate.

INTERRELATED CONCEPTS

Health policy is not an isolated concept. Several additional concepts discussed in this textbook are closely related to health policy (Fig. 59.3). Data and research are used to generate support and interest for a specific health policy agenda. This use of **Evidence** supports advocacy. Distribution of scarce resources and policy development to enhance the greater good while minimizing harm require the use of ethical decision making. Balancing the competing values of fairness (**Ethics**) and efficiency (**Health Care Economics**) is a major challenge to designing and implementing successful health policy, particularly policies to address **Health Disparities and Health Equity**. The tension described previously among cost, quality, and access highlights these competing values. Nurses are in a unique position to combine their advocacy role of ensuring patient **Safety** and **Health Care Quality** with ethics and health economics values of fairness, access, and cost efficiency. In some contexts, it may be difficult to distinguish health policy from **Health Care Law**. Health policies are often the result of new laws, but health policy can also become the impetus for new laws.

CLINICAL EXEMPLARS

In the United States, nurses can expect to encounter a wide variety of health policies that have a direct effect on their work. A sample of some of the more visible and relevant health policies that shape the environment of nursing is listed in Box 59.2. Although it is beyond the scope of this textbook to describe each exemplar in detail, a few are featured here with a brief description.

Featured Exemplars

Patient Self-Determination Act

The Patient Self-Determination Act (PDSA) requires healthcare facilities such as hospitals and nursing homes to provide patients with information related to their preferences for end-of-life care. For example, some patients will choose to accept all life-saving measures should their condition deteriorate while hospitalized. Under the PDSA, the facility should inform the patients of their right to make their own decisions about their end-of-life care and the facility's policies respecting those decisions. A statement by the patient that informs the family, the provider, and the facility of the patient's wishes is known as an *advance directive* and is covered by the guidelines of this law.[28]

Emergency Medical Treatment and Labor Act of 1986

The Emergency Medical Treatment and Labor Act of 1986, commonly referred to as *EMTALA*, was enacted to prevent the denial of emergency services to patients chiefly because they are

Fig. 59.3 Health Policy and Interrelated Concepts.

BOX 59.2 EXEMPLARS OF HEALTH CARE POLICY

Federal

- Americans with Disabilities Act of 1990
- Emergency Medical Treatment and Labor Act of 1986
- Health Information Technology for Economic and Clinical Health Act of 2009 (electronic health records)
- Health Insurance Portability and Accountability Act of 1996
- Patient Protection and Affordable Care Act of 2010
- Patient Safety and Quality Improvement Act of 2005
- Patient Self-Determination Act of 1998
- Promoting Health/Preventing Disease: Objectives for the Nation, *Healthy People 1990, 2000, 2010, 2020,2030*
- Social Security Act of 1965 (Medicare and Medicaid)
- The Mental Health Parity and Addiction Equity Act of 2008
- U.S. Preventive Services Task Force
- The Affordable Care Act 2010
- Mandated Health Coverage and Medicaid Expansion 2012[32]

State

- Scope of practice and licensing for nurses as defined by state professional practice acts
- State public health programs and policies related to infectious diseases
- State public health regulations that govern healthcare facilities
- State statutes and case law related to professional negligence and malpractice

Local

- City and county fire codes that govern safe occupancy limits in healthcare facilities
- City and county ordinances that govern facility maintenance, signs, utilities, parking, and/or traffic around hospitals and other health facilities
- City and county tax districts for publicly supported facilities

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uninsured and unable to pay for their care. Common practice before this law was to transfer patients to "safety-net" hospitals, usually tax-supported public hospitals. EMTALA was meant to stop private hospital facilities from "patient dumping" to public hospitals at taxpayer expense.[29]

American Recovery and Reinvestment Act of 2009

The American Recovery and Reinvestment Act (ARRA) included the Health Information Technology for Economic and Clinical Health Act of 2009 (HITECH), which amended the Public Health Service Act to establish a nationwide health information technology infrastructure, including the development of health IT standards, interoperability and certification, reports on quality, and reimbursement incentives to improve the quality of health care. A section of the act also addresses privacy and security concerns associated with the electronic transmission of health information through several provisions that strengthen the civil and criminal enforcement of the 1996 Health Insurance Portability and Accountability Act (HIPAA) rules.[30–33] As with all federal regulations, rules are updated as new issues arise. These updates are printed in the Federal Register.[32]

21st Century Cures Act (2016)

The 21st Century Cures Act provided additional federal resources to improve clinical trial design and streamline drug approval process in addition to addressing the opioid epidemic, mental health, cancer research, and precision medicine initiatives. Additionally, authorities put in place with the HITECH Act were further expanded to address cost of care transparency, patient access to their health information, improved health data interoperability and severe penalties for actors who participate in information blocking.[34,35]

2012 Supreme Court Ruling on Mandated Health Coverage and Expansion of Medicaid

The Supreme Court has final authority for determining whether congressional laws are congruent with the U.S. Constitution. In the case of *Independent Business v. Sebelius,* the court upheld the constitutionality of mandating health coverage (the *individual mandate*) but ruled that the expansion of Medicaid eligibility outlined in the Affordable Care Act was unconstitutional. This is an example of the interplay of checks and balances between the three branches of government. The legislative branch passed the Affordable Care Act. The judicial branch ruled on a case brought before the Supreme Court upholding one part of the law as constitutional and ruling another part of the law unconstitutional. The administrative branch under the auspices of the U.S. Department of Health and Human Services (USDHHS) rewrote regulations to accommodate the ruling that Medicaid expansion cannot be required of states.[36] The majority of states have enacted programs related to the ACA Medicaid expansion.

Scope of Practice and Licensing for Nurses

The U.S. Constitution is based on federalism—sharing of powers between the national, state, and local governments. The federal government is granted powers explicitly outlined in the Constitution. The 10th Amendment of the Bill of Rights provides that states have powers not outlined in the Constitution and not prohibited by the states.[37] Regulation of healthcare professionals is one of the powers granted to states. Each state issues licenses based on state licensure rules and regulates health professional behavior based on state laws and regulations. For nurses, state licensure is usually regulated through a nurse practice act.

CASE STUDY

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Case Presentation

The confidentiality of medical information became an agenda item for Congress when electronic data systems became widely adopted throughout the United States. The increased use of computers in health care had created the capacity for critical healthcare information to be efficiently shared among individuals/patients, healthcare providers, and insurance companies. Advocates for patient confidentiality and information privacy argued that the ease of information sharing through electronic transmission of personal health data would result in personal health information (PHI) becoming available to a wide variety of interested parties. Access to this information could result in a variety of actions, including denial of coverage through employer-sponsored plans to individuals or family members with chronic or debilitating conditions. Other unfavorable outcomes from the unrestricted sharing of private health information could also result, such as the sale of mailing lists of individuals with particular medical conditions to companies with a commercial interest in obtaining those lists.

The intent of the Health Insurance Portability and Accountability Act (HIPAA) of 1996 was to limit the ability of employers to deny health insurance coverage to their employees based on preexisting medical conditions. In the formulation of a policy response, the intervention chosen by Congress was to limit access to healthcare information to only those parties with a legitimate role in the financing and delivery of services, specifically healthcare providers, insurance companies, and third-party contractors.[35] Through HIPAA, Congress directed the USDHHS to implement the policy by developing privacy rules that protect electronically transmitted health information. These rules cover any entity that must have access to this information for legitimate purposes and provide guidelines for determining access to and disclosure of protected health information. Criminal and financial penalties are provided for proven HIPAA violations, including federal prison sentences for perpetrators and fines of up to $250,000. Investigations and prosecutions of HIPAA violations are the responsibility of the USDHHS Office of Civil Rights (OCR) and, if possible criminal violations have occurred, in collaboration with the U.S. Department of Justice. USDHHS regulations after the passage of the 21st Century Cures Act leveraged the information sharing that HIPAA permits among covered entities and business associates and added the requirement that certain "actors" that have a patient's electronic health information (EHI) must share that information upon the patient's request, without delay or face civil monetary penalties for information blocking.

One of the federal agencies tasked with public review and reporting for federal policies is the U.S. Government Accountability Office (GAO). The GAO has published different reviews of HIPAA at the request of government officials throughout the years since the passage of the statute, and these reports are publicly available on the GAO website. A review documents the ongoing issues of implementation of this widespread policy that governs the electronic transmission of healthcare information.[31] HIPAA provides broad guidelines for the protection of patient information that must be interpreted for implementation. Covered entities targeted by the statute are expected to develop and maintain HIPAA-compliant policies that govern the treatment of protected health information in their organizations and during transactions with contracted third parties (i.e., "business associates"). USDHHS often provides additional guidance on the implementation of HIPAA as the need arises, such as that which occurred with the COVID-19 pandemic response. Additional regulatory updates are expected, especially as it relates to patient access and electronic health information, and these will be created through USDHHS rule-making authority and will be publicly available for comment and feedback by affected organizations and the general public during the rule-making process.

Case Analysis Questions

In what ways does this case demonstrate components of health policy as a concept?

Why was this policy an issue at the federal level as opposed to being managed at the state level?

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

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CONCEPT 60

Health Care Law

Kathleen Ann Hessler

Ours is a government of liberty, by, through and under the law. No man is above it, and no man is below it.

Theodore Roosevelt

I don't know that there are any short cuts to doing a good job.

Sandra Day O'Conner

Healthcare delivery in the United States is a complex network of business systems that include healthcare providers, payers, and adaptable organizations. Healthcare businesses must continue to evolve to meet the rapidly changing demands of the legal and regulatory environment. There are numerous explanations for the complexity in today's healthcare systems. Key reasons include the gap in care affordability, disparate geographic locations and delivery systems, an increase in fraudulent billing activity across provider types, and increasing medical specializations in the delivery of care. Additionally, the emphasis on quality of care and the rise of state medical malpractice cases across the country have created greater scrutiny on the importance of the standards of care and evidence-based best practices for all healthcare professionals. Furthermore, these professionals are subject to state statutes and regulations regarding their license to practice under the state law. Nurses must be aware of the various aspects of healthcare law and its applications. More importantly, nurses must understand the effects and consequences of these laws on nursing practice.

DEFINITION

Law is a system of rules that are created by a society or government to promote or regulate specific behaviors and relationships, to manage crime, and to establish business agreements. Laws may either prohibit action or require action on the part of individuals, businesses, or the government. Health law is a specialization in the field of law, which deals with a myriad of aspects of health care, including, but not limited to, the practices of healthcare practitioners and provider entities, the rights of patients, quality-of-care issues, and requirements of payment for medical and healthcare services. Healthcare professional licensure issues and certification matters are recognized by many as part of the spectrum of healthcare law as are state medical malpractice acts.

For the purpose of this concept presentation, healthcare law is defined as *"the practice of law involving federal, state, or local law and rules or regulations regarding the delivery of healthcare services. In addition to healthcare provider issues and regulations of providers, health law includes legal issues regarding relationships between and among providers and payors."*[1]

SCOPE

The scope of healthcare law involves a collection of laws that have a direct effect on the delivery of health care or on the relationships among those in the business of health care or between the provider, payors, and consumers and patients. The executive, legislative, and judicial branches of federal and state governments hold the authority for the creation, implementation, and enforcement of law. The process for creating healthcare law is through the United States Congress or the state legislative processes, regulatory activities by government agencies, or precedent-setting judicial opinions resulting from court cases. These processes represent an interwoven method that fosters a continuing evolution in healthcare law (Fig. 60.1).

Sources of Law

Healthcare law originates from primary and secondary sources of state and federal law, including, but not limited to, constitutional law, statutory and administrative law, common law, tort

and contract law, criminal law, and, in some instances, employment law (Fig. 60.2).

Federal statutory law is formed under the authority of the United States Constitution and enacted through Congress. Similarly, each state authorizes the creation of law under its constitution, or similar document, and enacts law through the state legislative process. Just as our federal government has an organized judicial branch, so does each state. Although federal law preempts state laws, state laws may be more restrictive than federal law; in these cases, the state's more restrictive measures govern. If state law conflicts with federal law, federal law governs. In some situations, like medical and recreational marijuana, which are prohibited under federal law, the federal government has chosen to ignore enforcement measures in the face of state law.

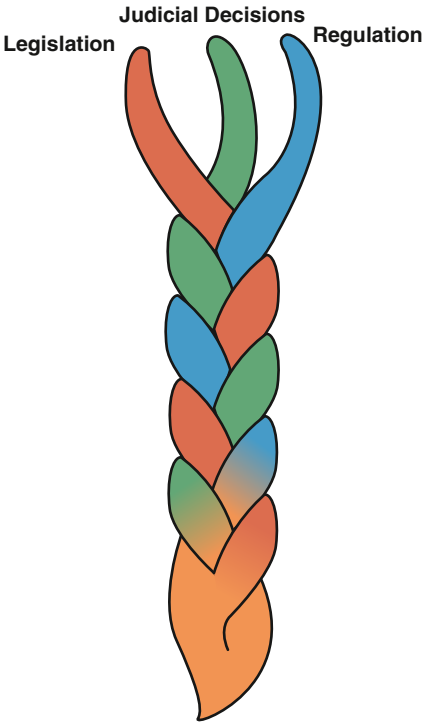

FIG. 60.1 Scope of Concept: Health Care Law.

Constitutional Law

Constitutional law deals with the fundamental principles by which a government exercises its authority. The United States Constitution defines the role, powers, and structures of our government—namely, the executive, legislative, and judicial branches. It also describes the basic rights of citizens and relationships between our federal government and the sovereignty of the states. Although the Constitution does not have a direct relationship to health care, the most frequently used grant of power in the Constitution for the enactment of healthcare legislation is found in Article I, Section 8 (last sentence): "To make all Laws, which shall be necessary and proper for carrying into Execution the foregoing Powers"[2] (commonly known as the taxing and spending power as well as the power to regulate interstate commerce).

Although the United States Supreme Court has not interpreted the Constitution as guaranteeing citizens the right to health care, the Supreme Court has held that the Due Process Clause of the Fourteenth Amendment provides protection under the Constitution for certain "liberty rights" related to privacy. Legislation created by federal or state governments that implicates the right to privacy has been reviewed under the strict scrutiny standard of review. Historically, the right to privacy, or liberty, has been upheld to encompass several rights, including, but not limited to, the right to use contraception (*Griswold v. Connecticut,* 1965),[3] to have an abortion (*Roe v. Wade,* 1973),[4] and the right to refuse medical treatment that sustains life as confirmed in the 1990 case of Cruzan *v. Missouri*.[5] In June 2022, the Supreme Court of the United States overturned *Roe v. Wade* declaring that the United States Constitution does not confer any rights to an

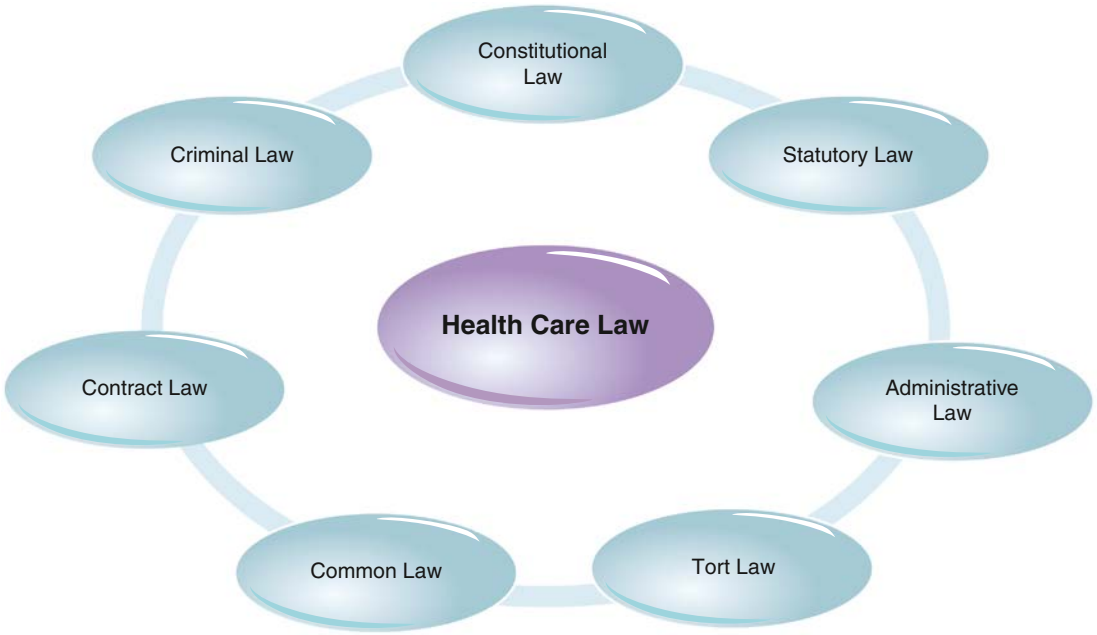

FIG. 60.2 Sources of Law.

abortion and that *Roe* was wrongly decided nearly 50 years ago. The case emphasizes that the opinion does not concern other rights under the constitution. It only addresses abortion, which concerns life, or a potential life. See *Dobbs, State Health Officer of the Mississippi Department of Health, Et Al v. Jackson Women's Health Organization Et Al.* No. 19-1392, 597, U.S. (2022).

Statutory (Legislative) Law

Federal and state statutory laws are important sources of healthcare law. These are laws that arise from legislative action. Many legislative laws at both the federal and state levels are enacted with the intent to directly affect the businesses or provider relationships in health care or to provide some form of health care for defined groups of people, such as the poor or chronically ill. Other laws may not have been enacted with the intent to directly affect health care, but they may influence the business of health care nonetheless, such as insurance laws. Because each state has an independent legislative body, the laws that are enacted may vary in title and scope, but the underlying authority to legislate for the general health and welfare of the people is the same.

As an example, the Social Security Act Amendments of 1965 are the federal legislation that established the Medicare and Medicaid programs.[6] While the Medicare program is fully administered and funded by the federal government, the Medicaid programs are administered by the states and share the responsibility of financing the programs with the federal government. Some states have multiple Medicaid programs that may differ depending on recipient needs.

Administrative Law and Regulation

Administrative agencies protect public interest and act as agents for the executive branches of the federal and state governments. Government agencies, as part of the executive branch of government, have the power to enact rules and regulations to promote public health and ensure that the intent of legislation passed by Congress or the state legislature is executed under the authority of the statute. They also have the authority to enforce the law and levy fines and remedies pursuant to regulation. Regulations aim to address healthcare system objectives, such as protecting the public's health by promoting quality services, preventing and controlling communicable disease, protecting the public against bioterrorism, ensuring disaster preparedness of healthcare providers, reducing healthcare costs through oversight of health insurance programs, promoting access to care, and protecting consumers who are in the market for health insurance and other types of coverage.

Examples of a federal administrative cabinet-level department that has a significant effect on healthcare law is the United States Department of Health and Human Services (DHHS or HHS) and its multiple government agencies. The United States Department of Veteran Affairs (DVA) is a peer organization to HHS and promotes and provides healthcare services for veterans. Each state has its own Department of Health (DOH) and Department of Human Services (DHS). The states also have the authority to regulate the practice of healthcare practitioners through state licensing boards, which are vested with executive powers to implement regulations through statutory practice acts.

Common Law

Common law, also referred to as judge-made law, case law, or judicial precedent, is a body of law derived from decisions made by appellate or supreme courts. The opinions of these courts become precedent and bind judges and litigants for future application in the jurisdiction. Common law can evolve and change with time, depending on the facts and legal issues in a case. Common law stands on equal footing with regulations and statutory law. However, case law decisions may further limit or expand statutory or regulatory law if the legislation or regulations are ambiguous and the court's opinion includes an interpretation of the law that was previously unclear. Sometimes one area of the country may not have addressed a question that another area of the country has already answered in the courts, and a court may adopt the ruling of another area without going through the process of litigating the question in the courts.

Tort Law

A tort is a wrongful action or omission, committed by an individual or entity, against a person who suffers harm from the act or omission. The individual harmed, also referred to as the *plaintiff* in a lawsuit, suffers a loss, which results in liability by the person responsible for the injury—referred to as the *defendant* in a lawsuit. A tort is customarily defined as a civil wrong under state law and is the basis for civil lawsuits. The most common basis for individual liability of nurses, physicians, and other healthcare providers, including hospitals, is rooted in tort law and is often referred to as medical negligence or medical malpractice. Tort law has been responsible for shaping and defining many quality and safety standards of health care.

The goals of tort law are (1) to provide relief to the harmed party, (2) to impose liability on those responsible for the harm, and (3) to deter others from such harmful acts. There are three categories of tort law: *intentional torts,* such as assault or battery; *negligent or unintentional torts,* such as a slip and fall or a car accident; and *strict liability,* where no degree of care matters, such as ultrahazardous materials or dangerous animals.

Contract Law

Contract law is the body of law that governs mutual agreements between two or more individuals, or groups of people or businesses. Contract law is a prominent mechanism under which healthcare services and transactions are conducted. The complex network of healthcare contracts extends but is not limited to healthcare contracts between insurance companies and consumers as well as agreements between insurance carriers and provider hospitals, physicians, durable medical equipment companies, and pharmacies. Healthcare business transactions (the buying and selling of healthcare business) are accomplished through contracts, as are other business relationships between healthcare entities and vendors.

Contracts govern relationships between the Centers for Medicare & Medicaid Services (CMS) and the State Survey Agency's agreement to monitor certified Medicare healthcare providers in that state. Additionally, CMS contracts with

companies to pay and audit Medicare claims for compliance with Medicare program and billing requirements. These are called Medicare Administrative Contractors (MACs).[7] Other examples of healthcare government contractors are Recovery Auditor Contractors (RACs), Zone Program Integrity Contractors (ZPICs), United Program Integrity Contractors (UPICs), and Quality Improvement Organizations (QICs).[8]

Admission agreements and patient consent forms of some healthcare services may be construed as a contract between the patient and the healthcare facility or provider. Some healthcare entities require patients to sign arbitration agreements on admission, just as many employers require new employees to sign such contractual agreements. However, the validity of patient arbitration agreements continues to be challenged in the courts; the courts do not always uphold them as valid contracts.

Criminal Law

Criminal law relates to crime and prohibits conduct that threatens or harms others or endangers the property or health or safety of individuals. It is distinguishable from civil law, as it authorizes punitive treatment of the offender. The federal government and each state have its own criminal code. Criminal penalties are levied under healthcare laws, including felonies associated with Medicare or insurance reimbursement fraud, abusive billing or referral practices, and misrepresentation of practitioner qualifications.

In particular, the federal Anti-Kickback Statute[9] is a criminal statute that prohibits the exchange, or an offer to exchange, anything of value to induce referrals to federal or state healthcare programs. Convictions for a single violation under this Statute have increased under the Bipartisan Budget Act of 2018 to fines of $25,000 to $100,000 and up to 10 years' imprisonment. Over the past several decades, a staggering number of healthcare providers have been indicted and convicted or have been excluded from providing healthcare services under the Medicare or state Medicaid programs for engaging in behaviors that solicit or pay for referrals of Medicare patients or beneficiaries.

Some states have passed criminal statutes that encourage prosecution of healthcare workers in cases of intentional or neglectful patient care. For example, in New Mexico, a state statute called Resident Abuse and Neglect[10] empowers the State's Attorney General's Office to prosecute healthcare providers or caregivers who harm residents in a care facility. In 2017, a patient died when a registered nurse, RaDonda Vaught, made a serious medical error when she administered a medication not ordered by a physician. Ms. Vaught reported the error per hospital protocol. In 2022, she was prosecuted for erroneously administering a medication that resulted in the death of the patient. At trial, Vaught was convicted of criminally negligent homicide and impaired adult abuse and was given 3 years' probation. This case is highly unusual in that it criminalized a medication error in what many healthcare professionals believe will have a chilling effect on healthcare providers reporting their mistakes. However, there are many factors that determine whether a district attorney will file charges and subsequently criminally prosecute a matter. The analysis of facts in a case are important to determine and distinguish intentional, reckless, grossly negligent, or negligent acts. While these types of cases often result in settlements with the healthcare provider, or the filing of a medical malpractice lawsuit, if a district attorney believes the facts of a medical error are so egregious, they may take steps to prosecute the person they allege is responsible for the harm.

ATTRIBUTES AND CRITERIA

Attributes and criteria represent identified characteristics and elements of a concept to enhance consistency in meaning and application of the concept. These include the structural elements of a concept and "rules" that must be present to qualify as a concept. Three major attributes for the concept of Health Care Law are as follows:

- Laws are created by Congress or the state legislatures on behalf of healthcare consumers to achieve healthcare policy goals.
- Regulatory agencies are charged with drafting and implementing regulations to ensure the effectiveness, and the intent of the statutes are accomplished without overly burdensome activity.
- Enforcement procedures are associated with subsequent punishment. Examples include fines and settlements, exclusion from government payment sources, auditing and monitoring programs, and jail time (if criminal law is implicated).

In addition to these attributes, there are generally accepted standards or guidelines that can be utilized to judge or determine adherence to the law and to assist providers in interpreting the law. These may include government guidance documents such as Medicare Interpretive Guidelines, advisory opinions, compliance program guidance, work plans, or other government tools. Other measures that have an effect on healthcare law include accreditation standards, evidence-based best practices, codes of conduct, standards of ethics, and social expectations and customs.

Though government guidance, accreditation standards, and codes of conduct are different from healthcare laws (they are not legally binding), if such guidance or standards are followed, a provider is likely to be deemed in compliance with these standards. In addition, a provider's compliance may be used as a defense in mitigating allegations of wrongdoing in litigation, government fraud actions, and alleged regulatory deficiencies. Healthcare law can be distinguished and differentiated from accreditation requirements, social expectations, and customs by considering the major and minor attributes presented in Box 60.1.

THEORETICAL LINKS

Legal theory is also known as *jurisprudence* and is the theoretical study of law, principally by philosophers. However, in the 20th century, social scientists studied the theory of law, striving to gain a deeper understanding of legal reasoning, legal systems, and institutions as well as the role law plays in our society.[11] There are several theories of jurisprudence, but the one most applicable to healthcare law is *normative jurisprudence,* which "*is concerned with 'evaluative' theories of law. It deals with what the goal or purpose of law is or what moral or political theories provide a foundation for the law.*"[12] In addition to the questions of defining what

BOX 60.1 Attributes and Criteria of Health Care Law

Attributes

- Created by a government body with appropriate authority, such as a legislature, agency, or court (judicial decision)
- Requires or prohibits actions
- Usually has enforceable sanctions such as fines, exclusion for government programs, auditing, and monitoring programs such as Corporate Integrity Agreements or Imprisonment
- Publicly available and accessible by any individual or group
- Consistent with national and state constitutions
- Can be modified, changed, or upheld through authoritative action

Criteria

- Guidance to promote a policy goal and provide steps to achieve compliance
- Interpretive guidelines such as State Operations Manuals (SOM)—Guide to Surveyors
- Standards of practice or best practices
- Reports from government agencies and data analytics
- Law and guidance may be self-limited, expiring after some time-period
- May vary in scope

law is, normative jurisprudence tries to answer what the proper function of law is or what actions should be subject to legal sanctions and what level of punishment should be allowed.

The need for healthcare laws has been determined through social practices, values, and morals, and the evolution of a complex healthcare industry that touches every American. There have been arguments over the course of many decades as to whether all Americans have a right to health care. The healthcare laws have evolved in an effort—albeit not always successful—to distribute health care fairly and equitably and to make it affordable to all. Healthcare laws are also enacted to monitor and punish bad behavior and bad actors who try to profit unlawfully in the healthcare industry.

CORE COMPETENCIES

Health Care Law

- Recognize sources of law and implications for professional nursing practice.
- Incorporate regulatory standards within professional nursing practice.
- Apply standards of care within practice, as appropriate for the specific license and state where practice occurs.
- Recognize and report violations of healthcare statutes, regulations, or provider policies and procedures, through appropriate channels in the organization and or directly to the government or insurance programs, as appropriate.

CONTEXT TO NURSING AND HEALTH CARE

The field of healthcare law is complicated and continues to evolve with the passing of statutory laws and the subsequent implementation of regulations by the applicable federal or state agencies. Many of these laws have a direct or indirect effect on nursing practice and livelihood. This section touches on the most important areas of healthcare law that affect the professional practice of nurses working in health care today. The body of law and its effects on health care are vast, and nurses should try to keep abreast of issues that are pertinent to their area of practice as well as to healthcare delivery.

Federal Statutory Laws Affecting Health Care

Federal statutory laws have had sweeping effects on the delivery of health care over the past half-century or more. Some examples include the Social Security Amendments of 1965 and 1983.[13] Others include the Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1986 and the Omnibus Budget Reconciliation Act (OBRA) of 1987 (also known as the Federal Nursing Home Reform Act),[14] the Patient Self-Determination Act of 1991,[15] and the Health Insurance Portability and Accountability Act (HIPAA).[16]

The most sweeping healthcare law in recent years that has affected all Americans, especially healthcare consumers and healthcare providers who participate in the Medicare program, is the Patient Protection and Affordable Care Act 2010,[17] also known as the Affordable Care Act (ACA), or Obamacare. This federal statute requires the Centers for Medicare and Medicaid Services (CMS) to draft and implement a vast array of regulations over several years' time. Implementation of the regulations continues today, requiring significant ongoing effort in the development of policy, and in the monitoring of healthcare providers to ensure compliance with new and ever-changing insurance requirements, billing and payment updates, compliance program requirements, and quality-of-care initiatives. Documentation of nursing care provided to patients should comply with the documentation requirements set forth by CMS for designated service lines, such as hospitals, skilled nursing facilities, home health, hospice, and others. Additionally, nurse notes should be truthful, timely, and objective—noting the medical necessity of the care provided. Finally, documentation should reflect compliance with standards of care and quality initiatives.

Administration and Regulation

Federal Regulation and Administrative Agencies

The United States Department of Health and Human Services (HHS)[18] is a federal cabinet-level department that has 12 operating divisions, including agencies in the U.S. Public Health Service and the human services agencies. (Box 60.2). The

BOX 60.2 Operating Agencies of the U.S. Department of Health and Human Service

- Administration for Children and Families (ACF)
- Administration for Community Living (ACL)
- Agency for Healthcare Research and Quality (AHRQ)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Centers for Disease Control and Prevention (CDC)
- Centers for Medicare & Medicaid Services (CMS)
- Food and Drug Administration (FDA)
- Health Resources and Services Administration (HRSA)
- Indian Health Services (IHS)
- National Institutes of Health (NIH)
- Substance Abuse and Mental Health Services Administration (SAMHSA)

agencies administer a variety of health and human services and conduct research while protecting and serving Americans. For example, CMS has a broad authority to draft the Medicare and Medicaid Conditions of Participation (CoPs) regulations for hospitals, skilled nursing facilities, home health agencies, and hospice providers, to name a few. These regulations focus on patient and resident rights, health standards that define quality and safety, consents for treatment, coordination of care and care planning, quality assurance and performance improvement (QAPI) programs, and other expectations for healthcare organizations participating in the Medicare and Medicaid programs.

Healthcare organizations must comply with the full range of CoPs regulations before they are granted certification to bill the Medicare or Medicaid programs. In addition to the federal agencies, HHS houses other offices and important programs that have healthcare oversight. For example, the Office for Human Research Protections (OHRP) protects the rights of human subjects involved in health research supported by HHS. This office was created in response to findings from the famous 1979 Belmont Report,[19] which exposed abuses and atrocities of subjects involved in research conducted by the federal government.

Licensing and Scope of Nursing Practice

All states and U.S. territories have legislated a Nurse Practice Act (NPA). This act establishes a Board of Nursing (BON) that has the authority to draft regulations or administrative rules to clarify and implement the act. Proposed rules and regulations must be consistent with the NPA and must go through a process of public review before enactment. Once enacted, they have the full force of the law in that state.[20] The goals of a BON are to protect the public's health and welfare through monitoring safe and competent nursing care. In addition to establishing the educational, examination, and competency requirements necessary to obtain a nursing license, practice acts and regulatory agencies also establish and enforce the context and scope of licensure within which regulated professionals must comply to retain their status as licensees in good standing. The scope of practice for professional nursing is the range of permissible activity as defined by the law; it defines what nurses can and cannot do.

Because the scope of nursing practice is defined by state legislation, there is variability from state to state in the range of activities that are legally authorized. It is important that a nurse become familiar with the practice act and the scope of practice in the state or territory where the nurse works. Some states are compact states offering nurses one multistate license; nurses should ensure they understand the scope of their compact license if they plan to work in more than one state. Although there is general consistency for the scope of practice for the professional registered nurse, there is significant variability from state to state for the defined scope of practice of a licensed practical nurse (LPN) or licensed vocational nurse (LVN). Finally, the range of practice for an advanced practice registered nurse (APRN) varies considerably from state to state.

The BON in each state also investigates and decides cases involving alleged violations of the state practice act and licensure. When a nurse is in violation of the practice act, the state board exercises its power to discipline the nurse to a degree consistent with the board's assessment of the severity of the problem and potential risk to the public. Disciplinary actions can range from censure and penalties, mandatory education, and ethics programs to progressively more undesirable consequences such as probation, suspension, and revocation or denial of licensure. Boards are required to report disciplinary actions to the National Practitioner Data Bank (NPDB). The NPDB is used by healthcare entities as a workforce tool for licensing, hiring, and credentialing decisions. Unlicensed practice of nursing is a criminal violation, and if a person is convicted, he/she may face fines and/or imprisonment in most states.[21]

Licensing of Healthcare Organizations

States have the authority to license and regulate healthcare facilities and businesses. Licensure requirements vary in terms of the services provided, the need for the service, physical location, building structure, safety, and staffing requirements. Most states require licensing of hospitals, nursing facilities, home health agencies, and hospices. Assisted living facilities (ALF) are state licensed with no accompanying federal regulations. The State Survey Agency will survey healthcare facilities and providers under the state licensing requirements that often mirror, or are more restrictive than, the Medicare CoPs. If a facility or business becomes certified under the Medicare program, the provider will be subject to both state and federal monitoring surveys.

Healthcare Fraud

Government oversight for healthcare fraud extends across multiple state and federal agencies and includes a vast network of activity and enforcement. Fraudulent and abusive billing practices have been detected over many years and have resulted in billions of lost dollars to the Medicare program. During 1995 to 1996, under the Clinton administration, HHS OIG conducted a pilot study called "Operation Restore Trust" in five states. More than 40 million dollars was recovered to the Medicare program with resulting criminal convictions and successful civil settlements.[22] This led to the establishment of the national Health Care Fraud and Abuse Control Program (HCFAC) in 1997.

Every year, the government's healthcare fraud recovery initiatives result in recoupment of billions of dollars back to the government healthcare programs. In fiscal year (FY) 2021, the U.S. Department of Justice (DOJ) obtained more than $5.6 billion in judgments and settlements from civil cases in which the government alleged fraud by businesses or individuals. Five billion dollars of the recovery related to matters involving the healthcare industry. This was the second largest annual recovery in False Claims Act history.[23]

From a criminal standpoint, in FY 2020, the DOJ opened 1148 new criminal healthcare fraud investigations. Additionally, federal prosecutors filed criminal charges in 412 cases that involved 679 defendants. Of these defendants, 440 were convicted of healthcare fraud related crimes that year. Finally, in FY 2020, HHS-OIG excluded 2148 individuals and entities from participation in Medicare, Medicaid, or other federal healthcare programs.[24]

Medical Negligence and Medical Malpractice

Medical negligence is enforced under state statutory law as well as tort law and is referred to as medical malpractice. In general,

there are four elements to a civil medical malpractice lawsuit for which the plaintiff, or accusing party, must prove in order to receive compensation. The patient must show evidence that the nurse, physician, or alleged healthcare provider (1) owed the patient a duty/standard of care, (2) breached the duty/standard in providing the care, (3) caused injury to the patient (causation), and (4) caused an injury that resulted in damages.

Duty of Care

The evidence presented by the patient plaintiff must establish that the nurse or healthcare provider owed a professional duty to the person harmed beyond the duty to exercise ordinary care. Professional duty arises from a special relationship between healthcare providers and patients. The standard of care for nurses is the degree of care that would be exercised by a "reasonably prudent nurse" acting under the same or similar circumstances. Examples of standards of care may include hospital or provider policies and procedures, the Code of Ethics for Nurses,[25] scope of practice under the state NPA, and accreditation standards such as The Joint Commission. Nurses with different areas of expertise or specialty practice are held accountable to the standard of care applicable to that specialty.

Breach of Duty

The second element that must be satisfied to establish liability is a breach of duty. Healthcare providers breach their duty to patients when they fall below the standard of care or deviate from the standard. It is important to remember that not all deviations from the standard of care will result in tort liability. For example, it is below the standard of care for a nursing professional to administer the wrong dose of medication to a patient. If the medication error does not result in harm or injury to the patient, the nurse will not likely face tort liability. However, the nurse may be terminated from employment or be subject to a disciplinary action by the state BON.

Causation

Causation is the link between breach and injury. If the injury would not have occurred "but for" the defendant's actions, there is causation. Causation establishes that the breach of duty legally caused injury to the patient. The breach of duty or violation of standard of care must be the direct or proximate cause of the harm that the patient experienced; in other words, if the breach had not occurred, no harm would have come to the patient. In many instances, causation can be difficult to prove in medical malpractice cases.

Injury or Harm

The final element to be satisfied in a negligence action is proof of injury or harm. The resultant harm may be physical or a combination of physical, mental, emotional, or financial harm. In some states, a patient cannot recover from emotional harm alone without an accompanying physical disability. An injury must be established by a preponderance of the evidence. Damages can be economic or noneconomic. Economic damages, such as loss of work and medical care, are easier to determine compared with noneconomic damages, such as pain and suffering or loss of consortium. A jury may award punitive damages if they believed (and were instructed accordingly by the judge) that the action or inaction of the healthcare provider was so egregious that the negligence rose to a level of gross negligence.

Employer/Employee Liability

Professional liability can attach to an employer for the negligent acts of its employee. This is known as vicarious liability, and it arises from the common law doctrine of *respondent superior,* a Latin-derived term that means "let the master answer." Under vicarious liability, an employer can be liable for the acts of its employee if the employee was acting as the agent of the employer and the actions that resulted in injury occurred within the scope of employment. To reduce the risk of liability, nurses should be cognizant of best-practice measures and include timely and truthful documentation to accurately support the services that were rendered, including, but not limited to, patient education and training.

Further, nurses should clearly understand and review the clinical policies and procedures where they work and understand the clinical regulatory requirements for the service line in which they are practicing (e.g., hospital, nursing facility, or home health or hospice agency). Additionally, nurses must be up-to-date on nursing procedure and expertise in the areas they practice. A nurse should seek additional training if he/she does not feel qualified to perform a specific task such as wound care or administration of chemotherapy. Nurses should consider options to purchase professional liability insurance. Although a hospital or other healthcare provider may cover a nurse in an allegation of medical or nursing malpractice under the entity's insurance coverage, that coverage may be limited and does not usually extend to Board of Nursing actions or other unforeseen events.

Laws That Affirm Patient Decision Making

Consent for Treatment

Historically, medical consent laws were largely shaped by common law. The common-law principle of self-determination essentially guarantees an individual's right to privacy and protection against the actions of others that threaten bodily harm. One of the first cases in the United States that established principles of consent for medical treatment was *Schloendorff v. Society of New York Hospital* (1914).[26] The case involved a woman who was admitted to a hospital for a stomach ulcer and the physician ultimately diagnosed a fibroid tumor. Although the patient consented to an examination under ether anesthesia, she refused the offered surgery. After the examination, the surgeon took her into the operating room and removed the tumor without her consent. Ultimately, there were consequences from the surgery, and the plaintiff filed suit based on the harm she sustained from complications of the surgery. This case underscores a patient's right to make decisions about their body, especially when an invasive procedure is being performed.

The concept of consent evolved into a process known as *informed consent.* Healthcare practitioners are obligated to disclose and explain procedures and treatment (including the risks and benefits of the procedure and disclosures about alternatives

to the proposed procedure) to a patient in language that they understand. Researchers are also obligated to obtain informed consent from individuals who participate as subjects in research. Consent must be given voluntarily in writing by the patient who has the requisite capacity to consent.

Prior to receiving healthcare services, it is a normal practice for a patient to sign paperwork consenting to receiving care that is generally provided in a particular setting. Even with this general consent, a nurse should always alert a patient prior to touching; the nurse should explain what she/he is going to do and why. If a patient refuses a specific treatment, the nurse should be respectful of the patient's wishes and communicate with the patient what the risks are in refusing the treatment. The nurse must notify the ordering practitioner of the patient's refusal. Additionally, the nurse must document the refusal (including the conversation with the patient about the risks of refusing the ordered treatment) and notification of the practitioner in the patient's medical record.

Competence and Capacity

The application of informed consent assumes that a patient is mentally competent and has the mental capacity to make reasonable decisions when all the necessary information is provided. Healthcare professionals may confuse competency with capacity or they may use the terms interchangeably.

Competence is a legal term that means a person has sufficient capacity and ability to make reasoned decisions. A person who is competent may make "poor" decisions or use "bad" judgment in making decisions. Such flawed decision making does not render someone incompetent to make reasoned decisions. The determination of incompetence is a judicial decision; in other words, a judge must make a legal determination of competency. Adults are presumed to be competent unless there is credible evidence revealing an inability to make a reasoned decision.

If a person is determined to be legally incompetent, the court will appoint a guardian over the person to make healthcare decisions and provide safety measures. If a person can make reasoned decisions but is unable to make decisions regarding financial or business matters, a court may appoint a conservator to handle their financial affairs only. Children under 18 years of age are presumed to lack competence unless proven otherwise. However, some state laws allow children of a certain age to make specific healthcare decisions without parental consent. If a guardian or conservator has been appointed by the court, a copy of these documents should be placed in the clinical record. Nurses should read and understand such documents and the extent of powers vested in the guardian.

Capacity refers to an evaluation or assessment of a person's ability to understand, appreciate, and manipulate information to form rational decisions. It is determined by a physician or other healthcare practitioner, not by a judge. Capacity may be affected by drugs or the current/underlying medical condition. For example, a person with a progressive dementia may be able to decide what they want for breakfast but may not be able to make a reasoned decision on whether to accept chemotherapy treatment for newly diagnosed cancer. Capacity can also change over time. For example, a person who undergoes brain surgery for a tumor may be deemed incapacitated for a period of time after the surgery. Nurses spend more time with a patient and may detect situations where a person is not making reasoned decisions; therefore, nursing documentation of objective observations is important to other practitioners in evaluating a patient's changing capacity.

Substituted Judgment and Best Interest Standards

When a patient is unable to give consent directly, a surrogate or agent can give consent on behalf of the patient. If a surrogate is not designated in advance by the patient and the patient was not deemed incompetent and assigned a guardian, the nurse should look to the state advance directive laws. Within the context of these laws, most states list surrogate decision makers based on their relationship to the patient. Usually, the spouse is designated as the legal decision maker. Next in line are typically the adult children, or the majority thereof. The extent of the list is specific to the state law.

If the surrogate decision maker has discussed the wishes and desires of treatment or end-of-life care in advance with the patient who is now incapable of making their own decisions, the surrogate is ethically bound to abide by the patient's wishes and stand in their shoes. This is called *substituted judgment.* If it is not clear what healthcare treatment or refusal of care an incompetent or incapacitated patient would choose, then the surrogate is ethically obligated to act in the best interest of the patient, known as the *best interest* standard. Surrogates may have a difficult time deciding to withdraw or withhold treatments, despite knowing what the patient would want them to do or what is in their best interest.

Advance Directives

Healthcare entities that receive federal funds are required to provide patients with written information about their rights to make their own healthcare decisions, including the right to execute written healthcare directives in advance, the right to refuse medical treatment, and to appoint a person or agent to speak and make decisions on their behalf if they become incapacitated. The provider must ask every patient if they have executed advance directives and document the patient's response in the medical record. If the patient has executed advance directives, the patient should be encouraged to provide these documents and they should be placed in the patient's medical record. A nurse should become familiar with the contents of a patient's directives. Providers are prohibited from discriminating against patients, based on whether they have an advance directive.

All states have laws outlining the specific details of drafting and executing advance directives. These laws encourage compliance with the patient's directive by giving healthcare providers, who act in reliance on these documents, immunity from civil or criminal liability. Some states impose criminal liability if a patient's advance directives are not followed.

Laws Affecting End-of-Life

The current discussions on end-of-life issues and the law have far surpassed the age of the right to refuse treatment that would hasten death. The issue of whether a mentally competent but terminally ill patient should have the right to hasten their death has been a hot topic of discussion and activity since controversial Jack Kevorkian advocated for assisted suicide on behalf of terminally ill patients in the early 1990s.

Oregon enacted the nation's first Death with Dignity Act in 1997.[27] As of this writing, nine states and Washington, DC have legalized physician-assisted suicide through state legislation. These states include Oregon, Washington, Vermont, California, Colorado, Maine, New Jersey, New Mexico, and Hawaii. The state of Montana has established legal physician-assisted suicide via court ruling. Over the years, more than 25 other states have introduced various forms of legislation advocating for these end-of-life options. Although many people liken these acts to state-assisted suicide laws, the language in the statutes distinguish the Death with Dignity Acts (also known in some states as Aid in Dying, End-of-Life Options Act, or End-of-Life Choices) from state-assisted suicide laws.

Death-with-dignity laws allow physicians to write a prescription for a lethal dose of medication that a mentally competent but terminally ill patient can use to end his or her life if the patient has less than 6 months to live. Various safeguards and protocols written into the laws must be followed by the prescribing physician. For example, Oregon's Act requires, in part, that the patient make two oral requests at least 15 days apart to the physician followed by a written request signed in the presence of two witnesses, one of whom cannot be a relative of the patient. It also requires two physicians to confirm the patient's diagnosis and prognosis and assess the patient's competency and mental health. Most states with such laws allow provider entities to opt in or out of participating. For example, the provider who opts out may be required to educate the patient on other options and to provide measures for the patient to be transferred to an entity or provider who will abide by the patient's lawful wishes. It is important to note that because the Veterans Administration Hospitals operate under federal law, it is illegal for the VA hospitals, physicians, and clinics to participate in prescribing lethal doses of medicine, regardless of a state's death-with-dignity law.

Confidentiality Laws

Patients have a right to confidentiality in regard to their health care. The HIPAA laws include strict requirements about the protection of patient information and distribution thereof; the law is strictly enforced, with significant penalties. Likewise, state laws may have confidentiality statutes specific to patient information. This era of electronic medical record systems requires a heightened awareness of these laws. Nurses should learn the pertinent substantive requirements of patient privacy and security laws that are applicable to their practice and always be cognizant and respectful of a patient's right to confidentiality and privacy.

INTERRELATED CONCEPTS

Four concepts are interrelated to Health Care Law: Health Policy, Ethics, Health Care Economics, and Health Care Quality, as shown in Fig. 60.3. At its most basic level, a law is a set of rules that are designed to help meet a specific policy or goal. As such, **Health Policy** encompasses the goal or expected outcomes, and healthcare laws require interventions or prohibitions that are intended to accomplish the health policy goal or expected outcome. **Ethics** is a set of values that guide our society and under which many healthcare policies and laws are made. In other words, our society's adherence to an ethical principle may drive a desire to adopt a policy and create laws that promote the policy.

Another concept closely interrelated to Health Care Law is **Health Care Economics**. As previously described, many laws have a financial incentive to compel compliance with the law. There are organizations and departments within healthcare organizations whose job is to ensure compliance with many healthcare laws and regulations. Within a healthcare organization or hospital, this task may be the responsibility of the compliance officer or compliance department. The compliance officer monitors the organization's activities so that the organization can continue to receive payments from the government and is not subject to any fines.

Finally, the concept of **Health Care Quality** is increasingly more interrelated to healthcare law. For example, as an added incentive to encourage healthcare provider compliance, the government healthcare programs have implemented value-based

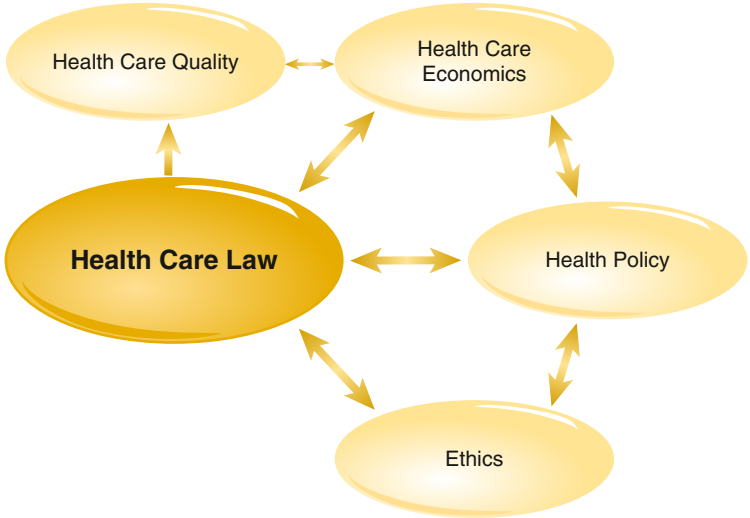

FIG. 60.3 Health Care Law and Interrelated Concepts.

purchasing initiatives that require healthcare entities to maintain data on specific quality measures at a predetermined level of acceptance in order for the provider to receive the highest level of reimbursement. Additionally, some enforcement agencies have brought actions under the false claims laws for government claims billed and paid under the theory of "worthless services," arguing that the patient did not receive the care as ordered or the quality of services per healthcare standards was not met.

CLINICAL EXEMPLARS

There are a multitude of exemplars of healthcare law, many of which have been highlighted throughout this concept presentation; the most common and important of these are presented in Box 60.3. Some exemplars are listed in more than one category. This illustrates the interrelated nature of the source of laws.

Featured Exemplars

Social Security Act Amendments of 1965 (Medicare and Medicaid)

The Social Security Act Amendments of 1965 created a trust fund for the establishment of the Medicare and Medicaid insurance programs for those who do not have medical insurance through employment (retired individuals and the unemployed).[28] The Medicare program has undergone many changes since it was initially enacted, and the federal government (CMS) can decide what rules healthcare organizations must follow to be eligible for reimbursement. One of the most significant changes was the adoption of payment based on diagnosis-related groups in 1983, which was also eventually adopted by insurance companies to compensate healthcare organizations for the care of those patients. Provider payment structures under CMS continue to evolve.

Emergency Medical Treatment and Active Labor Act of 1986

The Emergency Medical Treatment and Active Labor Act (EMTALA) was a provision of the COBRA of 1986.[29] The policy underlying EMTALA is that hospitals with active emergency departments have a duty to care for those requiring emergency medical services irrespective of a patient's ability to pay. Medicare-participating hospitals that offer emergency services must provide an appropriate medical screening exam to a patient who presents for treatment. The hospital must stabilize any emergency medical condition before transferring the patient to another facility. If the hospital is unable to stabilize the patient's condition, the hospital can arrange for transfer to appropriate level of care.

Health Insurance Portability and Accountability Act of 1996

The HIPAA of 1996 was enacted to provide individuals with preexisting medical conditions access to health insurance if they changed or lost their job. Another element of HIPAA is to prevent healthcare fraud and abuse and promote medical liability reform. The act also included a provision (known as the Privacy Rule) for health information privacy requirements for individually identifiable health information. The Privacy Rule protects

BOX 60.3 EXEMPLARS OF HEALTH CARE LAW

Federal Statutory Laws
- Social Security Act Amendments of 1965
- Social Security Act Amendments of 1983
- Federal False Claims Act of 1986
- Emergency Medical Treatment and Active Labor Act of 1986 (EMTALA)
- Omnibus Budget Reconciliation Act of 1987
- Patient Self-Determination Act of 1991
- Health Insurance Portability and Accountability Act of 1996 (HIPAA)
- Patient Protection and Affordable Care Act of 2010 (also known as the ACA and Obamacare)
- Americans with Disabilities Act of 1990 (ADA)

Federal Regulations
- Centers for Medicare and Medicaid (CMS) CoPs for Hospitals, Nursing Facilities, Home Health and Hospice Agencies (enforced by the States with a contract between CMS and a State Survey Agency)
- HHS/OIG Healthcare Provider Self-Disclosures
- Emergency Preparedness Rule (EP)

State Statutory or Regulatory Laws
- Criminal Background Checks
- Immunizations
- Public health and safety: disease surveillance, disaster preparedness
- Consent
- Confidentiality
- Advance Directives/Living Wills/Statutory Surrogates
- Death with Dignity, Aid-In-Dying, or End-of-Life Options Acts
- Good Samaritan Acts
- State Nurse Practice Acts and Scope of Practice

Torts
- Negligence
- Medical Malpractice
- Patient Abandonment

Contracts
- State contract law
- Health insurance plans: consumers and insurer
- Agreements between the government/insurance payers and providers
- Agreements between providers and healthcare organizations
- Independent Contractor Agreements
- Admission Agreements for nursing facilities, assisted living, and continuing care communities

Criminal Liability
- Federal and State Anti-Kickback Laws
- Medicare and Medicaid Fraud
- Non-Government Health Plan Insurance Fraud
- Patient Criminal Abuse and Neglect
- Assisted suicide laws
- Active euthanasia
- Sexual assault

ACCESS EXEMPLAR LINKS IN YOUR GIDDENS EBOOK

the confidentiality of patient health information relating to the provision or payment of health care for a past, present, or future physical or mental health condition but does permit the "minimum necessary" use and disclosure of protected health information without patient authorization for purposes of treatment, payment, and healthcare operations.[30]

Health Information Technology for Economic and Clinical Health Act, 2009

The Health Information Technology for Economic and Clinical Health (HITECH) Act was enacted as part of the American Recovery and Reinvestment Act of 2009. HITECH broadened the scope of HIPAA's Privacy Rule and provided for more enforcement of noncompliance by establishing increased levels of culpability and raising penalty amounts for compliance violations.[31] In addition, HITECH includes specific requirements for notifying individuals when their protected health information has been breached or improperly used or disclosed without authorization.

Patient Protection and Affordable Care Act of 2010

The ACA includes provisions enabling Americans with preexisting conditions to more easily afford insurance, the creation of health insurance exchanges making insurance coverage more accessible and affordable for some individuals and small businesses, and the elimination of insurance copays for preventive care. The law also required every American to purchase the minimum essential health insurance.[32] The provision of the individual insurance mandate was overturned during the Trump administration and became effective in 2019.

Federal False Claims Act of 1986

The Federal False Claims Act is the most effective tool used by the government in combating healthcare fraud and abusive billing practices. A person or entity may be in violation of this law if she/he or the entity (A) knowingly presents or causes to be presented a false or fraudulent claim for payment or approval or (B) knowingly makes, uses, or causes to be made or used a false record or statement material to a false or fraudulent claim.[33] This law also allows for whistleblowers to bring actions against a provider. Evidence to support the government's allegations of false claims usually originates from lack of documentation to show that a patient received the services that were ordered. Additionally, evidence may reveal a lack of clinical documentation to show that the patient needed the services provided. In

CASE STUDY

Case Presentation

Candace Thompson, RN, was working in the emergency department (ED) of a hospital. A 73-year old women, Ms. Carmen Reyes, who has type 1 diabetes mellitus and midstage Alzheimer's Disease was brought to the ED by her daughter and assigned to Candace. The daughter reported that her mother lost consciousness briefly at home but she "woke back up" after giving her some juice. Because of her mother's diabetic condition, the daughter decided to bring Mrs. Reyes to the ED following the incident for an evaluation. The daughter also told Candace that she needed to leave but would come back after the evaluation was completed.

The physician examined Mrs. Reyes and ordered blood work, including a blood sugar level and a stat glucose finger stick blood test. His orders included transferring the patient to the medical floor for observation.

Candace immediately drew the blood and sent it to the lab. She elected not to do the finger stick blood test because the blood sugar result would be back within the hour. Twenty minutes later, Candace received notification that a bed was ready for Mrs. Reyes on the medical floor. In the process of transferring to a wheelchair, Mrs. Reyes fell to the floor, hitting the back of her head. Mrs. Reyes told Candace that her legs were tingling and weak. Candace sat her up and called a transport aide who helped move Mrs. Reyes into the wheelchair. Candace quickly finished her documentation, and the transport aide took Mrs. Reyes to the medical floor.

Because she was very busy and there were no other witnesses to the fall, Candace did not document the fall in the patient's medical record or write out an incident report, per policy. She believed it was unnecessary because Mrs. Reyes appeared fine; nor did she think the patient would recall the fall.

Shortly after Mrs. Reyes arrived on the medical floor, she told the receiving nurse that her head hurt and that she had fallen in the emergency department. Then she passed out. Upon examining Mrs. Reyes, the nurse noted a large abrasive area with some fresh blood on the back of the patient's head. The medical floor nurse called the physician; in the meantime, the blood glucose test came back low at 25 mg/dL. A bolus of intravenous glucose followed by a glucose infusion was administered, and an MRI of the brain was ordered. The patient subsequently died of a subdural brain hemorrhage which the daughter alleged was caused by the fall. She is threatening to file a lawsuit on behalf of her mother's estate.

As part of the case review, the risk management team wanted to get more information about the fall and the lack of information provided during handoff as well as missing documentation in the patient's chart. Specifically, there was no information about whether the patient had had a fingerstick blood test, no admission assessment was documented by the ED nurse, nor was there any mention of the patient's diabetes or a fall. The risk management team interviewed Candace who admitted the patient fell and that she did not document or report it. She also admitted not following the doctor's order to obtain a finger stick blood glucose and not following protocol in transferring a patient to the wheelchair. Candace was terminated immediately. The Chief Nursing Officer notified the State Board of Nursing as required under state law for failure to follow standard of care protocols and doctors' orders.

Case Analysis Questions

1. Consider Box 60.3. What sources of law are implicated in this case?
2. What actions or inactions of the nurse violated policy and or law? Explain.
3. Would you consider this situation neglect of a patient? If so, could there be a potential criminal action against this nurse under state abuse and neglect laws?

other words, the terms *medical necessity* or *eligibility* to receive services under the Medicare or Medicare programs must be proven through documentation.

CASE STUDY

Case Presentation

Keri Williams, RN, worked at a home health agency and liked the independence of being out of the office and having control over her schedule. While at work, she would do errands and skip two or three visits a week. She lied to the patients, telling them that the doctor ordered one visit per week rather than two. She falsified the records of the missed visits by documenting the time she would normally spend with a patient. She also falsely documented assessments. The home health agency billed the Medicare program for these missed visits.

A fellow nurse who learned what Keri was doing called the home health agency's compliance hotline to report her. Keri was put on administrative leave during an investigation and was terminated from employment when the agency verified that she falsified the records. The agency self-reported the false billings to the Medicare program and calculated what they had to pay back to the government. The employer reported Keri Williams to the state Board of Nursing.

Case Analysis Questions

1. Consider the False Claims Act and whether the nurse could be charged under civil or criminal law, or both.
2. What possible course of actions will the state Nursing Board take against this nurse?

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